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TOTAL ARMY REQUIREMENTS PROGRAM - PHASE I (TARP-I).(U)

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TOTAL ARMY REQUIREMENTS PROGRAM - PHASE I

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10 Norwood W. Fleming
William J. Mayhew
George R. Fischer

PREPARED BY

SYSTEMS FORCE MIX DIRECTORATE

US ARMY CONCEPTS ANALYSIS AGENCY

8120 WOODMONT AVENUE

BETHESDA, MARYLAND 20014

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Commander
US Army Concepts Analysis Agency
ATTN: Director of Systems Force Mix
8120 Woodmont Avenue
Bethesda, MD 20014

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The TARP-I Study consists of an analysis of the Army requirements determination process, starting with the development of force requirements and ending at Army acquisition objective and secondary item war reserve requirement computation. The existing planning factors sources, scenarios, and methodologies used to determine wartime requirements for all classes of supply, support force structure, and personnel casualty replacements were analyzed for consistency. Inconsistencies in the requirements determination process are presented along (continued)

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STUDY REPORT
CAA-SR-81-14

TOTAL ARMY REQUIREMENTS PROGRAM - PHASE I

(TARP-I)

July 1981

Prepared by

System Force Mix Directorate

US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, Maryland 20014

CAA-SR-81-14

DEPARTMENT OF THE ARMY
US ARMY CONCEPTS ANALYSIS AGENCY
8120 WOODMONT AVENUE
BETHESDA, MARYLAND 20014

REPLY TO
ATTENTION OF
CSCA-SMC

7 July 1981

SUBJECT: Total Army Requirements Program - Phase I (TARP-I)

Deputy Chief of Staff for
Operations and Plans
Department of the Army
ATTN: DAMO-RQR
Washington, DC 20310

1. Reference letter, DAMO-RQR, 3 Dec 80, subject: Study Directive - Total Army Requirements Program - Phase I (TARP-I), that directed the US Army Concepts Analysis Agency to conduct a study to review the processes and methodologies used to develop the Army wartime requirements for personnel, ammunition and materiel.

2. Attached is the final report that documents our analysis of the Army requirements determination process, starting with the development of force requirements and ending at Army acquisition objective and secondary item war reserve requirement computation. The existing planning factors sources, scenarios, and methodologies used to determine wartime requirements for all classes of supply, support force structure, and personnel casualty replacements were analyzed for consistency. Inconsistencies in the requirements determination process are presented along with their causes and effects. Measures to improve the consistency of this process are identified and presented as management prescriptions.

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Major General, USA
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SUMMARY

1. PROBLEM. The 1979 Department of Defense (DOD) Sustainability Study criticized the Army for using inconsistent assumptions and planning factors in determining wartime requirements for personnel, ammunition, and materiel. A March 1980 Secretary of Defense (SECDEF) Memorandum to the Service Secretaries and the Chairman, Joint Chiefs of Staff (JCS) directed the designation of single office responsibility for consistency in the wartime requirements determination processes. A June 1980 Secretary of the Army Memorandum to the SECDEF appointed the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS) as the responsible Army Staff (ARSTAF) element and established the requirement for a review of Army planning factors, scenarios, and methodologies used in wartime requirements determination in order to identify inconsistencies and recommend corrective action. The US Army Concepts Analysis Agency (CAA) was officially directed to study this problem in a tasking directive from the Deputy Chief of Staff for Operations and Plans dated 3 December 1980 (Appendix B).

2. PURPOSE. To conduct a review of the Army wartime requirements planning factor development process and recommend appropriate actions to achieve and maintain consistency within the process.

3. APPROACH. The requirements determination process, was laid out schematically starting with the development of force requirements and ending at Army acquisition objective (AAO) and secondary item war reserve requirement computations. To facilitate later detailed investigation, emphasis was placed on determining the major participants down to the directorate level. An investigation of the detailed determination of force structure development, wartime personnel requirements, and logistic planning factors was conducted. The primary methods employed were numerous personal interviews with Army Staff officers and a progressively expanding literature search.

a. The development of ARSTAF inputs to the Program Objective Memorandum (POM) were examined in detail. These were grouped for analysis into the areas of:

- Force requirements development.
- Manpower requirements development.
- Equipment requirements development.

b. For each of these areas, the supporting planning factors were identified, and the analytical processes by which they were developed were examined.

c. Interrelationships between supporting processes were analyzed to identify common input sources, dependence of one process on other processes, and cause and effect relationships.

d. Inconsistencies in these supporting processes were identified and evaluated.

4. OVERVIEW OF THE CURRENT REQUIREMENTS DETERMINATION PROCESS

a. Each year, the Secretary of Defense, aided by the Joint Chiefs of Staff, translates broad national objectives into military objectives and strategies. These prescribed strategies form the basis for planning documents which recommend a total force structure and supply the analysis and operational framework for programing and budgeting the resources needed to carry out the defense mission. Traditional military planning proceeds within the Joint Strategic Planning System (JSPS). Army planning supports the Department of Defense Planning, Programing and Budgeting System (PPBS) and the JSPS. Through its planning process, the Army determines force objectives, force capabilities, and the resources needed to execute Army roles and missions. An overview of the Army requirements development process is shown at Figure 1.

b. The ultimate purpose of the Army requirements determination process is to estimate, as accurately as possible, the total quantity of equipment and personnel necessary to fully outfit the Army's approved force structure in peacetime and to provide those essential war reserve stocks and replacement personnel needed to sustain this force in wartime. As illustrated in Figure 1, the requirements determination process is composed of the following major areas:

(1) Force Structure Development. The program force is developed in response to SECDEF's Defense Guidance. The combat and combat support forces are provided by the ODCSOPS. Doctrinally required combat service support units are added as a result of computer simulations conducted by CAA. The resultant total force is reviewed by the ARSTAF and modified to provide a program force that is balanced and attainable. This ARSTAF review process appears to be too time consuming and lacks an audit trail.

(2) Supporting Analytical Studies. CAA supports the requirements determination process with two yearly studies, the Total Army Analysis Study (TAA) and the Wartime Requirements Study (AMMO/WARF). The AMMO/WARF Study methodology is currently being replaced by the Wartime Requirements for Ammunition, Materiel, and Personnel (WARRAMP) methodology. While significant progress in the supporting studies area has been made, the AMMO/WARF and TAA studies need further alignment. Essential to this effort is an ODCSOPS effort to eliminate conflicting scenario guidance and inconsistent input data.

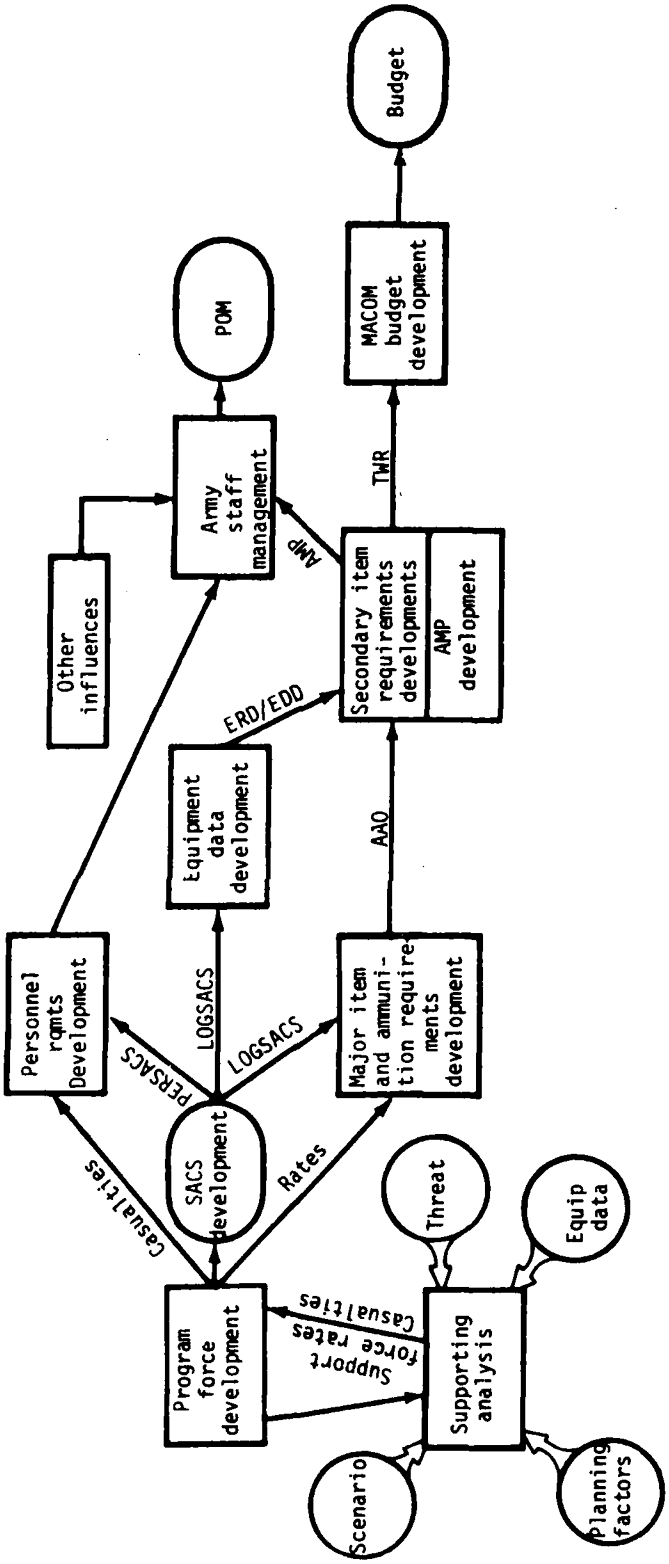

Figure 1. The Army Requirements Determination Process

(3) Structure and Composition System (SACS). The SACS is a system of computer programs and input data files which produces a summation of the manpower and equipment requirements to outfit a selected force. The SACS is made up of the Personnel Structure and Composition System (PERSACS) and the Logistic Structure and Composition System (LOGSACS). The SACS binds together the requirements for forces, personnel, and equipment and is used as a source document, in one form or another, in all parts of the process. The SACS is not a data base; rather, each SACS output is a one-time product and is not subsequently updated. As presently configured, the SACS is too cumbersome, lacks the necessary degree of flexibility and responsiveness, and cannot handle equipment modernization over time.

(4) Personnel Requirements Development. Wartime requirements for personnel, excluding CONUS base requirements, are separated into two distinct catagories--those personnel needed to fully man the force and those necessary as replacements after initiation of hostilities. PERSACS generates the personnel requirements of the force while projected replacement personnel figures are developed through computer simulations at CAA. The current PERSACS does not project the manpower, recruiting, and training requirements of proposed equipment changes. The emerging WARRAMP methodology and the results of the CAA Casualty Estimation Study should provide a more definitive assessment of replacement requirements.

(5) Major Item and Ammunition Requirements Development. The Army acquisition objective (AAO) is the quantity of an item of equipment or ammunition required to equip and sustain the approved US Army force and specified allies. The AAO computation is performed by the Research, Development and Acquisition Information Systems Agency (RDAISA) and utilizes data inputs from a wide range of sources. AAO computation is totally dependent on equipment and deployment data shown in the LOGSACS and the consumption and European loss rates contained in the AMMO/WARF Study results. The AAO computation process is sound, but the results are inconsistent due to different equipment densities used in the LOGSACS and the AMMO/WARF Study and inaccurate due to a lack of consumption rates for all theaters.

(6) Secondary Item Requirements Development. At present, no direct linkage between the computation of secondary item major resource requirements and the other parts of the process exists. Since the SACS does not accurately incorporate the time-phased Basis of Issue Plan (BOIP) to reflect the effect of equipment modernization over time, the US Army Depot System Command (DESCOM) has developed its own procedure to apply BOIP to generate more accurate equipment densities. Due to the DOD focus of attention on the budget year of the POM period, war reserves computations are based on that year. Figures for other POM years are merely extensions of budget year data.

(7) ARSTAF Management. The requirements determination process functions primarily in support of the POM development. Thus, the products of requirements determination are provided to the ARSTAF. The ARSTAF reviews these results to ensure that the requirements meet the DOD guidance and are fiscally and realistically attainable. If consistency in the Army requirements determination process is to be assured, the prevailing tendency to deal with the various parts of the process independently and in isolation must be corrected. Currently, the requirements determination process is not under control of a single ARSTAF focal point which would ensure consistency of input data during all its phases and provide stability to the entire process.

5. INCONSISTENCIES

a. During the course of this study, inconsistencies within the requirements determination process were identified and analyzed to determine what management actions at HQDA and subordinate commands could eliminate or reduce their impact on the overall process. Each of these inconsistencies, in general, has an undesirable effect on the accuracy or credibility of the requirements estimates produced by the process. Seldom were these inconsistencies clear-cut or unique to a single part of the process, but rather were interrelated and difficult to isolate. In the same way, it is difficult to match up corrective actions to specific inconsistencies, since, in most cases, a single comprehensive corrective action, such as centralizing control of input data, will eliminate a number of inconsistencies throughout the process. The following is a summary of the significant inconsistencies discussed in Chapter 4 and suggested prescriptive actions which should be taken to eliminate them.

b. Table 1 lists the significant inconsistencies identified during this study, their principal causes, and a brief assessment of the effect these inconsistencies have on the requirements determination process. Table 2 relates these same inconsistencies to the principal categories of requirements being determined to illustrate the interrelated, and sometimes pervasive effect they have. An "X" appearing in a column under one of the requirements categories means that that category of requirement is somehow distorted or has reduced credibility because of that inconsistency. Abbreviations not identified in the text are described in the glossary and the main report.

Table 1. Inconsistencies in the Requirements Determination Process
(page 1 of 2 pages)

Inconsistency	Cause	Effect
Simulation in TAA and AMMO/WARF studies based on different scenarios	Different assessments of which scenario best accomplishes the purpose of each study	Rates and force structure not aligned when used in AAO computation, distorts AAO; casualties not aligned with equipment losses
Simulation in TAA and AMMO/WARF studies based on different equipment mixes and densities	Same as above; is also caused by late or changed data inputs	Rates and force structure not aligned when used in AAO computation; distorts AAO; casualties not aligned with equipment losses
CEM calibration of TAA and AMMO/WARF studies based on different high resolution data	High resolution input data late; TAA has to run with on-hand data; input data changes after high resolution simulation begins	Rates and force structure not aligned when used in AAO computation; distorts AAO; casualties not aligned with equipment losses
ARSTAF adjustments unbalanced support force structure	Constraints on personnel ceilings; political and other considerations	Support forces cannot be analytically justified; rates are not aligned with force structure when used in AAO computation
PERSACS does not include impacts of BOIP and SHN changes as does LOGSACS	PERSACS is completed before BOIP and SHN data is applied	Personnel requirements do not include results of equipment modernization
Patient admission rates in AFPDA and FM 101-10-1 are different	AFPDA rates are set deliberately lower than FM 101-10-1 rates for use in analytical studies	Personnel and medical equipment requirements are possibly understated

Table 1. Inconsistencies in the Requirements Determination Process
(page 2 of 2 pages)

Inconsistency	Cause	Effect
Casualty estimates produced on different basis from ammunition and equipment consumption rates	Different scenario used for TAA and AMMO/WARF studies; casualty estimates produced by different methodology (TAA)	Personnel and equipment requirements are not aligned
Equipment densities in LOGSACS are not the same as those used in rates studies nor do they reflect the true densities in the force	Lack of capability to time-phased BOIP	AAO is distorted
Deployment schedules used in AAO computation are not the same as those used in rates studies	Use of different scenarios in TAA and AMMO/WARF studies	AAO is distorted
Post-D-day consumption for theaters other than Europe based on Europe rates	No rates computed for other theaters	AAO is distorted
Rates for some items of equipment not based on simulation; no linkage with rates studies	No rates computed for some items	AAO is distorted
Equipment densities used in secondary item requirements computations not the same as those used for AAO computation	Use of PEM impacted LOGSACS to develop density data	Secondary item requirements not directly related to major item requirements
Secondary item requirements based on first year of POM only	DOD focus is primarily on the budget year of POM	Same as above
Secondary item requirements in POM based on previous year's data	Timing of computational process	Same as above

Table 2. Effects of Inconsistencies on Categories of Requirements

Inconsistency	Force structure	Personnel	Major items	Secondary items
Simulation in TAA and AMMO/WARF studies based on different scenarios	X	X	X	
Simulation in TAA and AMMO/WARF studies based on different equipment mixes and densities	X	X	X	
CEM calibration of TAA and AMMO WARF studies based on different high resolution data	X	X	X	
ARSTAF adjustments unbalance support force structure	X		X	
PERSACS does not include impacts of BOIP and SHN changes as does LOGSACS		X		
Patient admission rates in AFPDA and FM 101-10-1 are different		X	X	X
Casualty estimates produced on different basis from ammunition and equipment consumption rates		X		
Equipment densities in LOGSACS are not the same as those used in rates studies			X	X
Deployment schedules used in AAO computatation are not the same as those used in rates studies			X	
Post-D-day consumption for theaters other than Europe based on Europe rates			X	
Rates for some items of equipment not based on simulation; no linkage with rates studies			X	
Equipment densities used in secondary item requirements computations not the same as those used for AAO computation				X
Secondary item requirements based on first year of POM only				X
Secondary item requirements in POM based on previous year's data				X

6. PRESCRIPTIONS

a. These prescriptions are based upon an assessment of the requirements determination process as it presently exists considering the improvement actions currently under way. They are organized to correspond to the major headings of the report and not arranged in order of importance or priority.

(1) Force Structure Development

(a) ODCSOPS should be alert to possible negative impacts of support force modifications and should document rationale for changes.

(b) Action should be taken by United States Army Management Systems Support Agency (USAMSSA) to provide dedicated computer support to ODCSOPS during program force development.

(2) Supporting Analytical Studies

(a) CAA should continue ongoing efforts to improve its analytical methodology, particularly the development and implementation of WARRAMP and the alignment of the AMMO/WARF and TAA Studies.

(b) ODCSOPS should take action to eliminate conflicting scenario guidance and inconsistent input data. A single respository for scenarios, assumptions and planning data would be very useful in this effort.

(3) Personnel Requirements Development

(a) When the WARRAMP methodology is operational, to include the personnel postprocessor, WARRAMP-produced casualty data should be used in personnel requirements determination instead of TAA casualty data.

(b) The results of the Casualty Estimation Study should be used as a basis for improving the casualty estimation methodology.

(4) Structure and Composition System (SACS). ODCSOPS should redesign the SACS to upgrade its capabilities and make it more responsive to the needs of the requirements determination process. As a minimum, this should include the capability to time-phase the application of BOIP to the force structure and to include the effects of equipment modernization in the PERSACS.

(5) Major Item and Ammunition Requirements Development

(a) CAA should develop the capability to compute ammunition and equipment consumption rates for theaters other than Korea and Europe.

(b) CAA should develop the capability to compute rates for an expanded weapon list, particularly air defense missiles.

(6) Secondary Item Requirements Development

(a) Efforts, already under way, to base the determination of requirements for secondary items more directly on combat simulations used to develop ammunition and equipment consumption rates should be accelerated.

(b) Secondary item requirements should be computed for all five POM years, and the computation schedule should be advanced to allow requirements to be included in the current POM.

(7) Consistency Management

(a) A focal point office for requirements determination consistency should be established within ODCSOPS with full authority to ensure compliance. This office should:

1. Develop and maintain a document or data base, having Army directive status, which contains a compilation of those scenarios, planning data, and assumptions which are to be used for all requirements determination purposes throughout a given POM cycle.

2. Monitor consistency and compatibility of methodologies used to determine requirements.

3. Coordinate all taskings to supporting analytical agencies in the requirements area.

(b) A 2-year analysis cycle should be adopted to increase stability in the requirements process.

(8) Benefits. Table 3 relates these prescriptions to the inconsistencies identified above and illustrates the benefits to be derived from their implementation. An "X" beneath a management prescription indicates that the action will assist in eliminating that inconsistency.

7. FOLLOW-ON EFFORT. To achieve a complete return on the work done in this study, additional follow-on effort is required. In general, the follow-on effort should use the results of this study as a starting point and build upon them to further refine the requirements determination process. Three areas appear to be suitable for follow-on work and result in significant improvements in the overall consistency, effectiveness, and usefulness of the process.

a. Single Respository for Scenarios, Planning Data and Assumptions. The follow-on effort should determine the form and the most effective way to implement this repository. This task would include a detailed review of the timing problem identified in Chapter 4 and the development of a feasible way to align all data inputs so that the process could utilize a single data source.

Table 3. Benefits of Prescriptions

Inconsistency	Improve methodology, align studies	Use single scenario	Document changes to support force	Use WARRAMP casualties	Redesign SACS	Document rates for other theaters and items	Link sec items to simulations and compute for 5 years	Centralize data	Adopt 2-year cycle	Monitor methodology
Simulation in TAA and AMMO/WARF studies based on different scenarios	X	X						X	X	
Simulation in TAA and AMMO/WARF studies based on different equipment mixes anu densities	X	X			X			X	X	
CEM calibration of TAA and AMMO/WARF studies based on different high resolution data	X	X			X			X	X	
ARSTAF adjustments unbalanced support force structure			X							
PERSACS does not include impacts of BOIP and SHN changes as does LOGSACS					X					
Patient admission rates in AFPDA and FM 101-10-1 are different	X								X	
Casualty estimates produced on different basis from ammunition and equipment consumption rates	X			X						
Equipment densities in LOGSACS are not the same as those used in rates studies	X	X			X			X		
Deployment schedules used in AAO computation are not the same as those used in rates studies	X	X			X			X		
Post-D-day consumption for theater other than Europe based on Europe rates	X					X				
Rates for some items of equipment not based on simulation; no linkage with rates studies	X					X				
Equipment densities used in secondary item requirements computations not the same as those used for AAO computation					X		X		X	
Secondary item requirements based on first year of POM only							X			X
Secondary item requirements in POM based previous year's data							X		X	X

b. Near-term versus Long-term Requirements. This study examined only the long-term, or outyear, requirements determination process. The follow-on effort should explore approaches to solving the problem of how best to allocate resources to achieve maximum near-term readiness while building Army capabiliites up to program requirements. This task would include an examination of how best to implement a 2-year analysis cycle.

c. Improved Methodology for Supporting Analytical Studies. The follow-on effort should investigate the feasibility of combining the several methodologies now being used by CAA to support the requirements determination process into one highly efficient methodology which will provide increased consistency and resource economies.

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FIGURES

TABLES

TOTAL ARMY REQUIREMENTS PROGRAM - PHASE I (TARP-I)

CHAPTER 1

INTRODUCTION

1-1. STUDY PURPOSE. The Total Army Requirements Program - Phase I (TARP-I) resulted from concern that inconsistent assumptions and planning factors were being used to determine wartime requirements for personnel, ammunition, and materiel. For the most part, Army wartime requirements are directly or indirectly dependent on the results of computer simulated warfare which, in turn, are a product of the assumptions, scenarios, and input data used in their development. The purpose of the TARP-I Study is to:

a. Conduct a review of the Army wartime requirements development processes.

b. Recommend appropriate actions to achieve and maintain consistency within those processes.

1-2. BACKGROUND. This study effort was requested by the Deputy Chief of Staff for Operations and Plans (DCSOPS) after correspondence relating to the problem had been received from the Secretary of the Army. That correspondence discussed quality and consistency of assumptions and factors used in all Army requirements studies.

a. In October 1979, the Office of the Secretary of Defense (OSD) Sustainability Study, an OSD-sponsored analysis of America's ability to sustain a war effort, was published and contained the following finding:

> "In many cases, a Service uses inconsistent assumptions/planning factors for the same OSD-specified scenario. In other words, munitions consumption, spares requirements, maintenance workloads, etc., are frequently based upon differing projected activity levels. It is neither appropriate nor feasible for OSD to routinely scrutinize the myriad details of Service wartime planning. However, assumptions and planning factors must be consistent to assure a balanced statement of requirements. Therefore, we recommend that a single office within each Service be assigned the responsibility for determining that <u>all</u> factors and assumptions underlying wartime requirements (including force structure) calculations be explicit, credible, and consistent."

b. On 25 March 1980, the Secretary of Defense approved the OSD Sustainability Study and told the Service Secretaries, "One shortcoming identified by the study, which only you can rectify, is a lack of consistency within the Services among the planning and analytical assumptions used for force structure, manpower, and logistics analyses and resource programing. I would like each Service Secretary to designate a specific office to be responsible for ensuring consistency in these processes."

c. On 25 June 1980, the Secretary of the Army informed the Secretary of Defense that:

"The Deputy Chief of Staff for Operations and Plans is responsible for developing the Army's ammunition and equipment requirements. The DCSOPS also is responsible for the quality and consistency of assumptions and factors used in all Army requirements studies. A special review of these studies is being planned; it should be completed by this time next year."

d. On 27 June 1980, the Technical Advisor to the DCSOPS informed the Deputy Assistant Secretary of Defense, Manpower, Reserve Affairs, and Logistics (MRA&L) that,

"The Secretary of Defense memorandum made particular note of the lack of consistency among the planning and analytical assumptions used for *sustainability analyses*. The Army is initiating a program to overcome this problem, and establish centralized control of the processes used in determining requirements for sustaining forces in combat. The program is called Total Army Requirements Program (TARP), and will be managed within the Requirements Directorate of the Office of the Deputy Chief of Staff for Operations and Plans, which already has Army Staff responsibility for developing ammunition and equipment requirements. The Concepts Analysis Agency (CAA) is being tasked to conduct an analysis of current planning factor sources, scenarios, and methodologies used in wartime requirements determination for each class of supply, for support force structure, and for personnel casualty replacements."

e. CAA was officially directed to study the problem in a tasking directive from the DCSOPS dated 3 December 1980 (Appendix B). The study directive established a study schedule requiring a final report by 30 June 1981.

1-3. OBJECTIVES. The objectives of this study were to:

a. Identify planning factors used to determine wartime requirements for personnel, support force structure, all classes of materiel, and the processes/methodologies used to develop them.

b. Classify these processes/methodologies by category (conventional ammunition, fuel, personnel, etc.), significance (major or supporting), and their dependence on, or contribution to, data developed by other processes/methodologies.

c. Evaluate processes/methodologies for consistency in assumptions, models, scenarios, and inputs.

d. Evaluate the interface between interdependent processes/methodologies.

e. Identify inconsistencies and their causes and evaluate the impact of each on the wartime requirements determination process.

f. Recommend corrective action, where appropriate, to eliminate significant inconsistencies in assumptions, inputs, models, scenarios, and processes/methodologies used for planning factor development.

g. Recommend scope and required characteristics for a methodology for optimizing wartime requirements.

h. Recommend a management concept through which centralized control and overview can be exercised.

1-4. SCOPE. The study directive provided for a two-phase study. Planning factor sources, scenarios, and methodologies used to determine wartime requirements for all classes of supply, support force structure, and personnel casualty replacements were to be reviewed and manually aligned during Phase I. This report contains the results of that review. A follow-on effort, Phase II, will use the results of Phase I to develop procedures and methods for standardizing, disciplining, and optimally resourcing requirements. The scope, planning, and tasking of Phase II will be determined at the completion of Phase I.

1-5. LIMITATIONS. To narrow the range of the study, the study directive imposed several limitations.

a. Functioning of models within methodologies was not reviewed, but consistency of outputs from similar use models was examined.

b. The study concentrated on the examination of processes/methodologies used to develop planning factors for use in the FY 83-87 POM.

c. The development of the program combat force was not reviewed.

d. Studies which justify specific end items, i.e., COEAs, were not considered.

1-6. CONTENTS OF THE REPORT. The following chapters, supported by appendices, present the results of this study. Chapter 2 contains a discussion of how the study was conducted. The current system that is used to develop force structure, personnel, and materiel requirements is described in Chapter 3. Chapter 4 discusses problem areas in the current system, actions currently being taken to improve data and planning factors, and identification of areas in which further improvement is required. Objectives 1-3a through 1-3c and objective 1-3g are accomplished in Chapter 4 and its accompanying appendices. Prescriptive measures that appear to have the potential of improving consistency in the requirements determination process are presented in Chapter 5. Objective 1-3h is addressed in Chapter 5. Chapter 6 presents observations for short- and long-term actions to improve the requirements determination process and lists inconsistencies along with their causes and effects. Objectives 1-3d through 1-3f are accomplished in Chapter 6.

CHAPTER 2

STUDY METHODOLOGY

2-1. INTRODUCTION. This chapter describes the methodology of the TARP-I study process.

2-2. EXECUTION OF THE STUDY METHODOLOGY. The study was conducted in two overlapping phases. First, the requirements determination process, starting with the development of force requirements and ending at Army acquisition objective (AAO) and secondary item war reserve requirement computation, was schematically laid out. To facilitate later detailed investigation, emphasis was placed on determination of the major participants down to the directorate level. Next, as the flow of the requirements process was determined, an investigation of the detailed determination of force structure development, wartime personnel requirements, and logistic planning factors was begun. The primary methods employed were numerous personal interviews with Army Staff officers and a progressively expanding literature search.

a. The Army Program Objective Memorandum (POM) development cycle for FY 83-87 was used as the principle analytical review case. Through this vehicle, the problem was bounded so as to include only those processes which are interrelated and therefore justifiably comparable. However, where significant improvements had been made in the process methodology since the FY 83-87 cycle, the latest version was used as the basis for analysis.

b. The planning factor development process was analyzed from the determination of requirements back to the computation of the underlying planning factors and processes. This method provided a consistency check on the application of individual planning factors and processes and facilitated investigation of the methodology by which each is generated.

c. The following specific tasks were accomplished:

(1) The requirements development process was traced and graphically displayed.

(2) The development of ARSTAF inputs to the POM were examined in detail. These inputs were grouped for analysis into the areas of:

(a) Force requirements development.

(b) Manpower requirements development.

(c) Equipment requirements development.

(3) For each of these areas, the supporting planning factors were identified, and the analytical processes by which they were developed were analyzed.

(4) Interrelationships among supporting processes were analyzed to identify common input sources, dependence of one process on other processes, and cause and effect relationships.

(5) Inconsistencies in these supporting processes were identified and evaluated.

(6) Where appropriate, corrective actions to eliminate inconsistencies were developed, and a management concept for ensuring their elimination was proposed.

(7) Based on the results of this analysis, the scope and objectives of TARP-II will be proposed.

2-3. QUALITY ASSURANCE. The major process for assuring the quality and reliability of this study was the conduct of periodic in-process reviews (IPR). Each IPR was attended by key personnel from the major organizations and agencies which sponsor, contribute to, or use requirements studies or the product of requirements studies. Active and open discussion during the IPRs assured that all relevant areas were being considered and that the proper problem areas were being addressed. In conjunction with each IPR, CAA convened a Technical Review Board (TRB) to review briefings and evaluate interim study procedures and results. Study reliability was also enhanced by continuous coordination with knowledgeable points of contact in ARSTAF agencies and operating agencies.

CHAPTER 3

THE CURRENT SYSTEM

3-1. ENVIRONMENT OF THE PROBLEM. Each year, the Secretary of Defense, aided by the Joint Chiefs of Staff, translates broad national objectives and policies into military objectives and strategies. These prescribed strategies form the basis for planning and programing documents which recommend a total force structure and supply the analysis and operational framework for programing and budgeting the resources needed to carry out the defense mission. Army planning and programing actions support this process by describing the resources needed to execute Army roles and missions. The Army requirements determination process is a series of interrelated subprocesses which are designed to estimate, as accurately as possible, the total quantity of equipment, ammunition, and personnel necessary to fully outfit the Army's approved force structure in peacetime and to provide those essential war reserve stocks and replacement personnel needed to sustain this force in wartime from D-day through the period of time and at the level of support prescribed in the OSD guidance. An overview of the Army requirements determination process is shown at Figure 3-1. This chapter traces the sequence of actions which occur in this process during the development of Army requirements through a series of annotated flowcharts.

3-2. THE PROGRAM FORCE DEVELOPMENT STAGE. The program force is developed in response to the Defense Guidance. The guidance is in the form of program force sizing and structuring scenarios which address threat, force objectives, areas of commitment, simultaneity of contingencies, mobilization, and warning. In addition, the Defense Guidance provides manpower and fiscal ceilings which may not be exceeded in developing the Army Service Program. With this guidance, the ARSTAF conducts a macroanalysis of major force structure alternatives. ODCSOPS (War Plans Division) serves as the ARSTAF point of contact. The objective of the analysis is to generate alternatives and obtain approval from the SPC/SELCOM of a base case combat force structure and deployment sequence which will be used in POM development. The base case combat force and deployment sequence become guidance for program force development. The objective of the ARSTAF is to build a force structure and recommend a deployment sequence which is within the guidance and retains as much of the planning force capability as possible while minimizing the risk of assuming a smaller force.

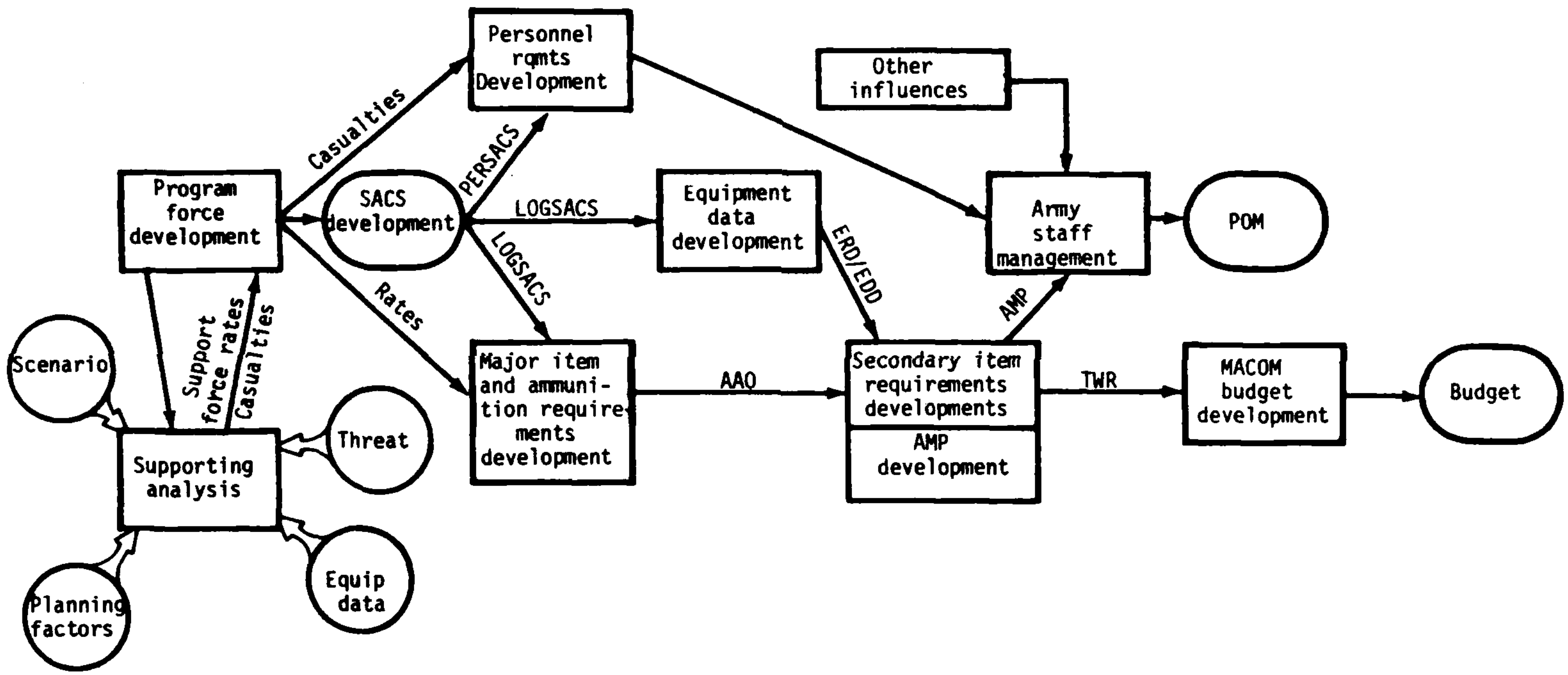


Figure 3-1. The Army Requirements Determination Process

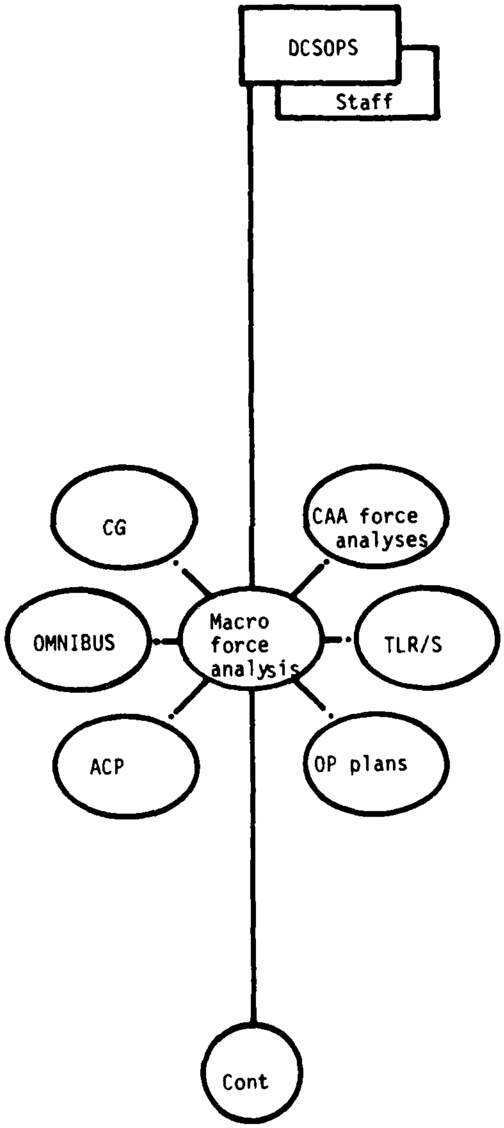
a. Guidance for Program Force Development. The Defense Guidance and resource ceilings are considered with the planning force, its development priorities, the POM period (the first 5 years) of the force development plan, attainability analyses, the program force currently developed, the current force, and any other capability analyses available at that time. Different force structures are considered for alternatives. FDD and unit priorities are considered in light of the scenarios offered by the Defense Guidance and component command force deployment lists. From this analysis are developed alternatives for a time-phased deployment list of divisions and brigades. After approval, ODCSOPS adds combat support units to structure the combat elements of the force. This addition reflects the most current doctrine and systems studies by TRADOC and DARCOM analyzed by ODCSOPS (Doctrine and Systems Integration Division). The combat force and deployment sequence form the guidance for program development.

b. Program Force Development Process. This process determines the total Army force structure requirements. It is a refinement step which leads eventually to a complete exposition of the force used to prepare the Army POM. CAA takes the guidance for program force development and generates the combat service support units which fully support the combat force and ammunition and equipment combat consumption rates for the proposed scenario. The list of required support units is studied by the ARSTAF, and the number and type of service support units are modified by current support policies. This refinement step is necessary, since the numbers and types of units are generated based on doctrine for the midrange period and because the total force exceeds the resource limitation guidance. Some of the considerations for decrementing the service support units in addition to resource constraints are: assumed availability and capability of POL pipelines in the combat area which are traded for POL units; assumed availability and capacity of ports adjacent or contiguous to the combat area which are traded for stevedore and port handling units; and assumed availability of a host nation labor force. POMCUS and stockpiling of supplies are also considered. Where that capability can be funded elsewhere for the program force, units are eliminated from the force structure. The results of CAA actions, modified by the ARSTAF, are a time-phased, balanced, deployable force for the final year of the program period. The deployable force has been structured and supported. ODCSOPS adds necessary nondeploying units, various headquarters, and special mission units to complete the total Army detail of units. The three stages of program development described thus far have taken 21 months. The program force development process ends in October. The force is "frozen" on the force tapes--no further units or changes to TOE will occur without general officer approval. The proposed program force is used as a basis for the SACS process which develops requirements for personnel and equipment. The program force is further decremented and altered throughout the POM development processes from October until May. The Joint Chiefs of Staff meet to assess the service POM and recommend risk reduction methods for the program force. The program force development stage ends.

The program force development process begins in February and March when the Army Staff conducts a macroanalysis of major force structure alternatives to select a combat force and deployment sequence in preparation for Total Army Analysis (TAA), a process that begins in mid-April.

DCSOPS and the Staff review the Defense Guidance (DG) which is issued in March and whose scenarios and resource ceilings guide program development.

In addition, DCSOPS and the Staff consider CAA computer-generated forces and analyses, results of the US Army Operational Readiness Analysis (OMNIBUS), Total Logistics Readiness/Sustainability (TRL/S) Analysis, the Army Capabilities Plan (ACP), and operation plans of the component commands.



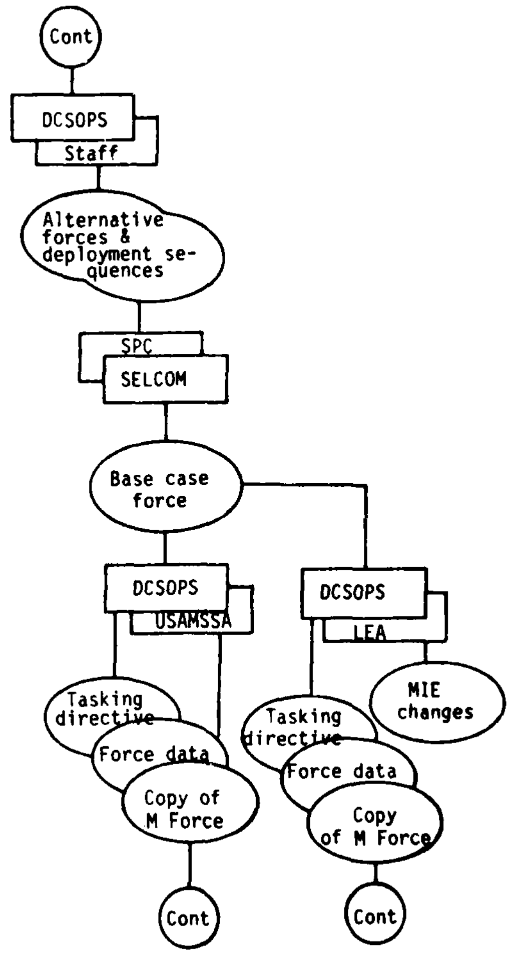
In coordination with the Staff, DCSOPS develops various force structures and sequences for their deployment.

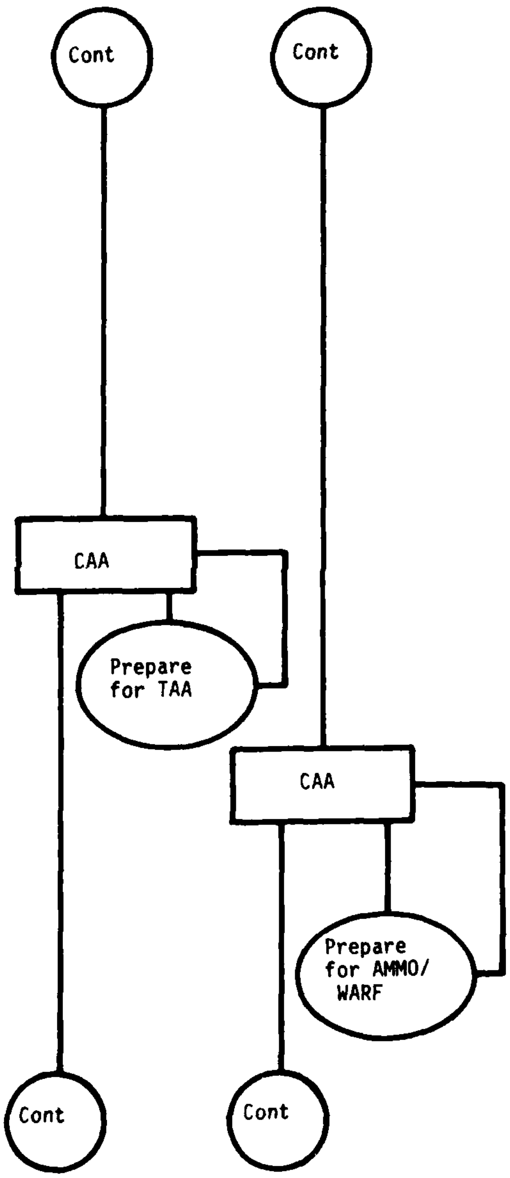
Alternatives are recommended to the Select Committee (SELCOM) in early April.

Assisted by the Strategy and Planning Committee (SPC), the SELCOM selects a combat force and deployment sequence to be used as the base case for force development.

Following selection of a base case force, DCSOPS (Force Structure Plans Div) issues a directive tasking CAA to conduct the annual TAA. War Plans Div forwards combat force data through USAMSSA and Force Structure Plans Div forwards a copy of the approved troop list of the total Army master force (M Force) by mid-April.

At this same time, DCSOPS (Requirement Programs and Priorities Div) issues a tasking directive to CAA to conduct AMMO/WARF. Major items of equipment (MIE) data changes are sent to CAA by the Logistics Evaluation Agency (LEA) by early May.





CAA completes the preparations for TAA that began before receipt of the tasking directive.

The data base is readied for use in computerized combat simulations.

CAA reviews Army Force Planning Data and Assumptions (AFPDA), determines AFPDA basis for analysis, and encodes data for input to analytical models.

CAA completes its preparations for AMMO/WARF; builds the force arrays required by new equipment and employment doctrine, incorporates MIE data changes into a complete MIE list; and continues to build the data base file required for computer simulation.

From June to October, DCSOPS, assisted by CAA and in coordination with the ARSTAF, conducts the TAA to determine a total Army force structure suitable for program development.

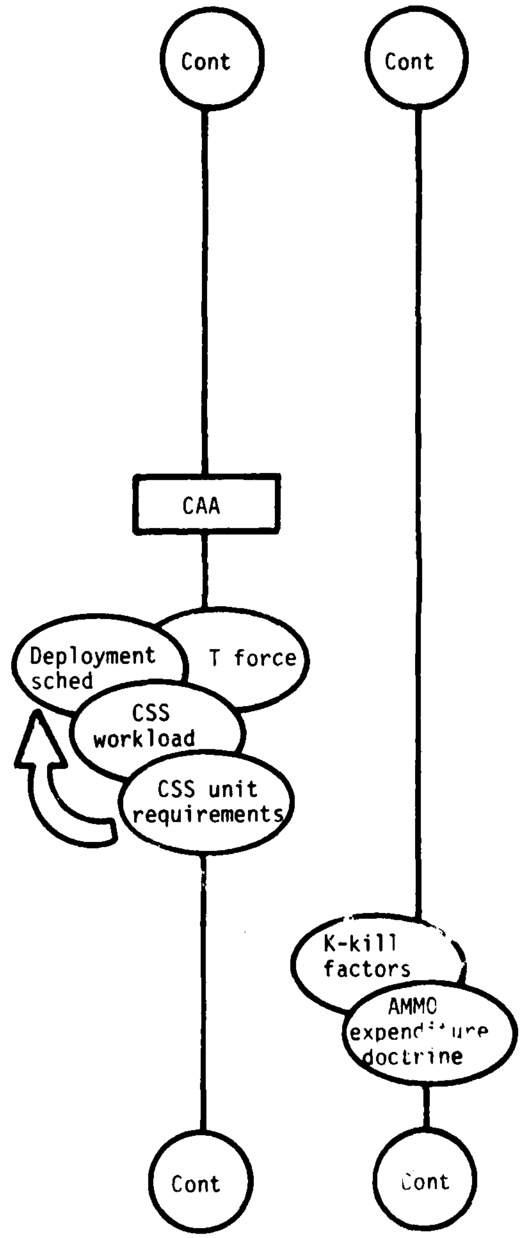
In late April, CAA considers the combat force in deployment sequence, estimating requirements for combat service support (CSS) units.

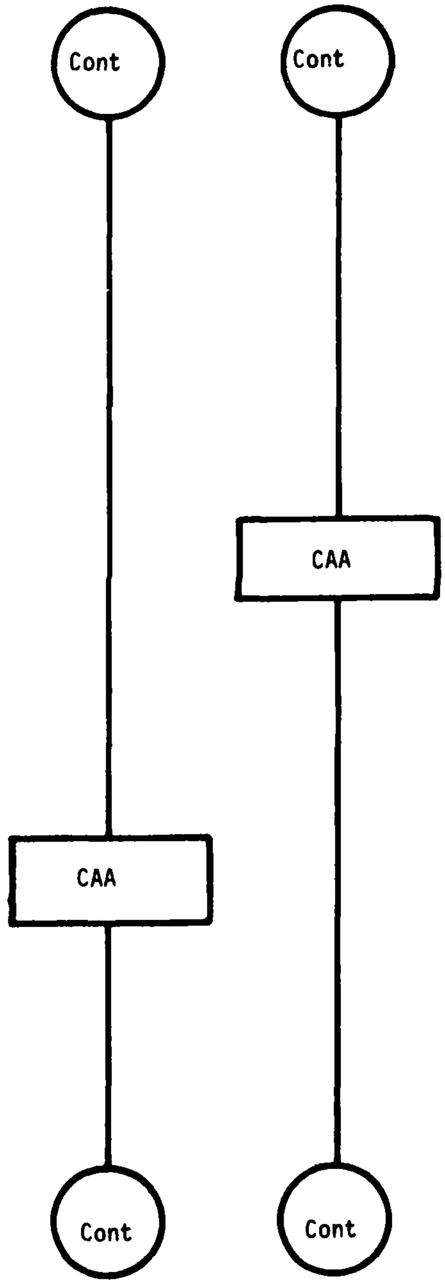
These are compared with strategic lift capabilities, and a deployment schedule is generated.

In mid-May, CAA receives catastrophic-kill (K-kill) factors from USAMSAA and current doctrine on ammunition expenditures from TRADOC.

From early May to mid-June, CAA uses wargaming to analyze theater force requirements over time.

CSS workload is determined from combat intensity; number of casualties, fuel consumption, ammunition expenditures, and maintenance needs.





In early June, the high resolution games at CAA produce the killer-victim scoreboards used in the warfight in support of AMMO/WARF. Arraying of the Red and Blue forces is completed.

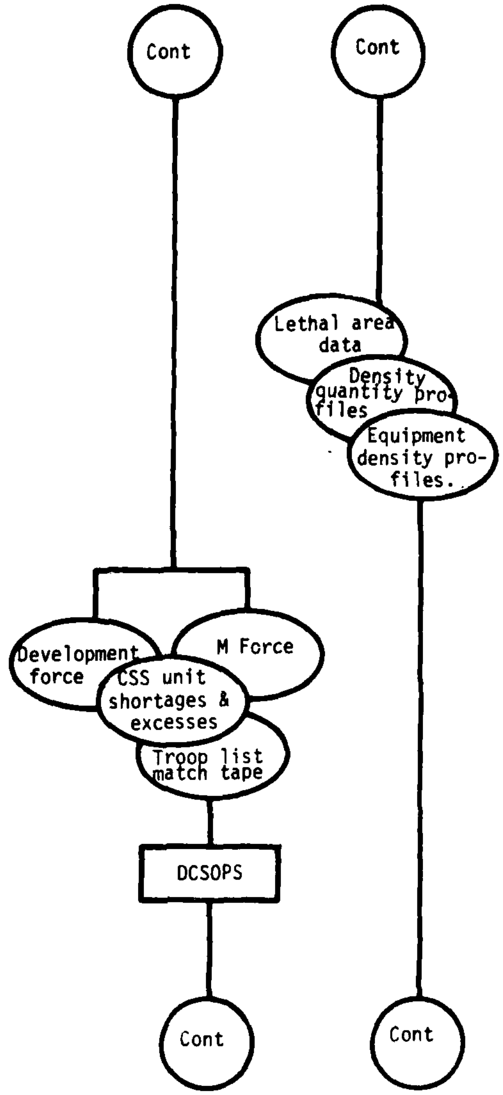
From mid-June to early July, CAA compares workload with doctrinal capability of CSS units.

Requirements for units are determined, and the deployment schedule is verified.

In early July, CAA compares requirements of the developed force with M Force projections, identifies shortages and excesses, and forwards troop list match tape to DCSOPS (Force Structure Plans Div) by late July.

During July, USAMSAA forwards lethal area data, used to produce a stylized loss rate, to CAA; the roundout force produced by TAA is input to the AMMO/WARF methodology; and the equipment density profile is received from LEA.

In August and early September, DCSOPS, in coordination with the Staff, analyzes and reviews the total requirements generated through TAA.



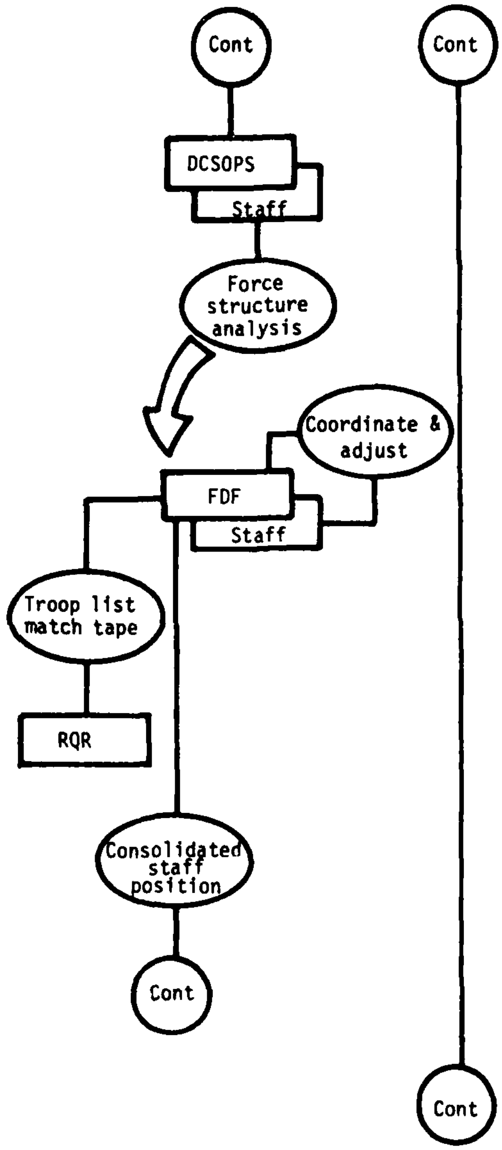
A force structure attainable with resource constraints is defined.

Force Structure Plans Div forwards this force list to the MACOMs for review and comment.

At the outset, Force Structure Plans Div (FDF) forwards the troop list match tape to Requirement Programs and Priorities Div (RQR).

Force Structure Plans Div reviews and makes initial adjustments in the force structure and coordinates with staff action officers.

In collaboration with the rest of the ARSTAF, DCSOPS develops a consolidated ARSTAF position and further adjusts force structure as required.

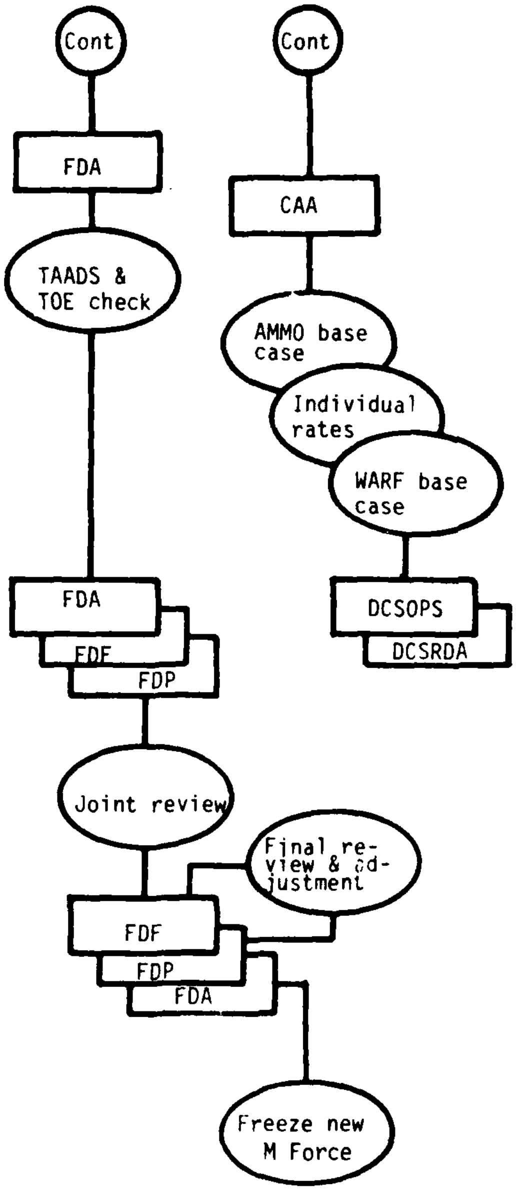


During September, Force Accounting and Systems Div (FDA) reviews the force structure and assures conformance with documentation in the data files of The Army Authorization Documents System (TAADS) and the Tables of Organization and Equipment (TOE) System.

By mid-September, the ammunition base case is completed, and the WARF base case is finished by early October. By mid-October, the individual rates have been produced. During this process, DCSOPS is provided draft data as it becomes available.

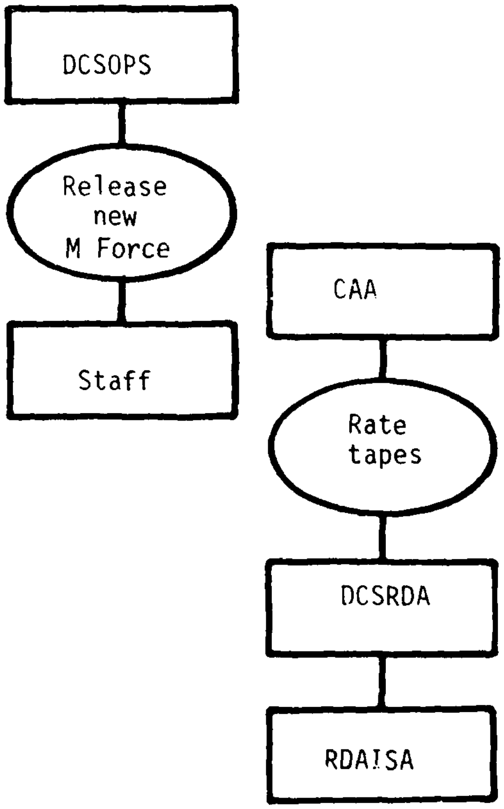
In early October, Force Accounting and Systems Div conducts a joint review of the force structure with Force Structure Plans Div (FDF) and Force Structure Management Div (FDP) for the purpose of making final adjustments to the force structure.

Force Accounting and Systems Div freezes the program M Force in the Force Accounting System (FAS).



After all reviews and adjustments are completed, DCSOPS (Force Structure Plans Div) releases the new M Force to the ARSTAF by late October.

In early November, the final report is sent to DCSOPS (Requirement Programs and Priorities Div) who reviews it and forwards the final approved AMMO/WARF study to DCSRDA. Concurrently, CAA sends a copy of the rate tapes to DCSRDA for forwarding to the Research, Development and Acquisition Information Systems Agency (RDAISA).



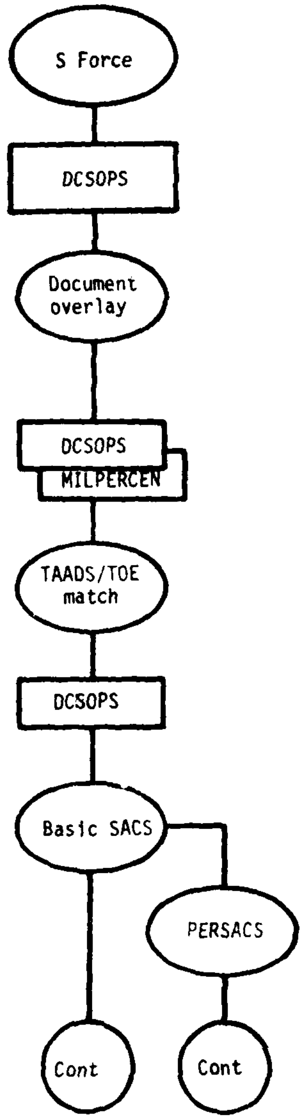
3-3. Structure and Composition System (SACS) DEVELOPMENT. From early November to early December, Force Accounting and Systems Division, in coordination with the Requirements Directorate and MILPERCEN, produces the PERSACS and the LOGSACS based on the frozen M Force file. After development, the PERSACS and LOGSACS are used to generate personnel and equipment requirements. The US Army Management Systems Support Agency (USAMSSA) performs the supporting computer analysis for the Army Staff (see Appendix E).

The frozen M Force is redesignated as the S Force in late October.

In early November, Force Accounting and Systems Div performs a document overlay to integrate personnel and equipment into one working data file.

Force Accounting and Systems Div, with input from MILPERCEN, conducts a TAADS and TOE match and produces the Basic SACS. Computer analysis support is provided by USAMSSA.

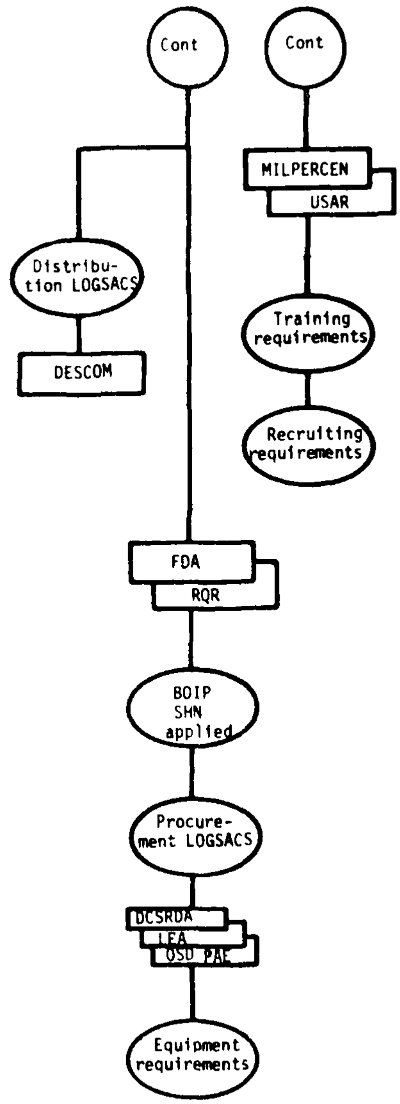
In early November, the Basic SACS is complete and DCSOPS releases the PERSACS through DCSPER to MILPERCEN and the USAR, who then determine their training and recruiting requirements.



At this same time, Force Accounting and Systems Div produces the Distribution LOGSACS and releases it to the US Army Depot System Command (DESCOM) through DCSLOG.

Force Accounting and Systems Div, along with Requirements Programs and Priorities Div, apply the Basis of Issue Plan (BOIP) and shorthand notes (SHN) to the Basic SACS.

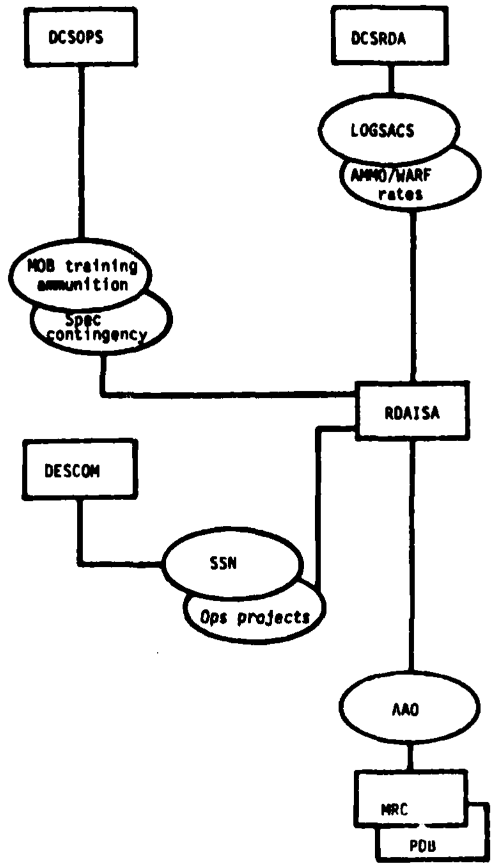
In early December, the Procurement LOGSACS is produced by Force Accounting and Systems Div and released to the Deputy Chief of Staff for Research, Development and Acquisition (DCSRDA), the Logistics Evaluation Agency (LEA), and the Office of the Secretary of Defense, PA&E.



3-4. ARMY ACQUISITION OBJECTIVE (AAO) COMPUTATION. After receipt of the LOGSACS, the Office of the Deputy Chief of Staff for Research, Development and Acquisition (ODCSRDA) obtains the AAO by combining initial issue quantities (IIQ) with quantities necessary for post-D-day consumption, POMCUS, maintenance floats, operational projects, and allied requirements (see Chapter 4).

In December, DCSRDA forwards the LOGSACS and the AMMO/WARF rates tape to RDAISA along with AAO computational guidance. RDAISA also receives a standard study number (SSN) tape and an additive project operational tape from DESCOM, a mobilization training ammunition tape, and a special contingency tape from ODCSOPS.

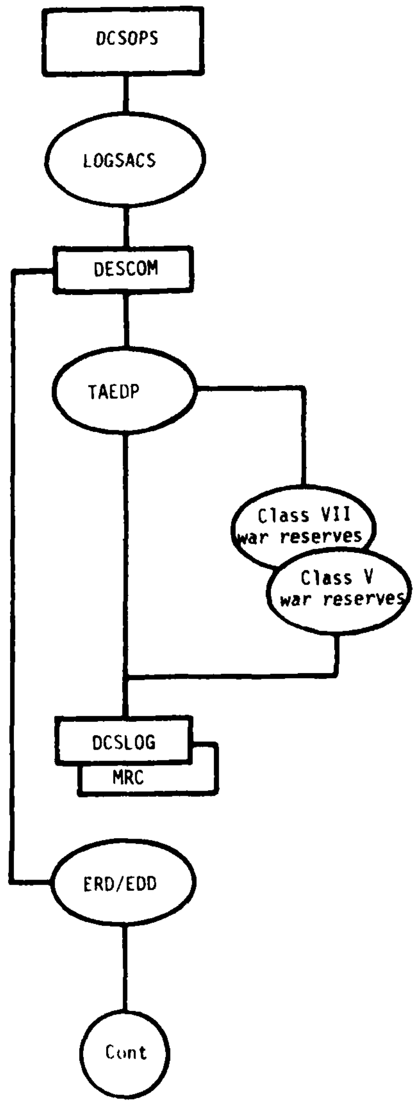
RDAISA computes equipment and ammunition AAO and provides them to the DARCOM Materiel Readiness Commands for use in preparing the Army Materiel Plan (AMP). AAO information is also entered in the DCSRDA procurement data base (PDB) for use in development of the Army procurement program.



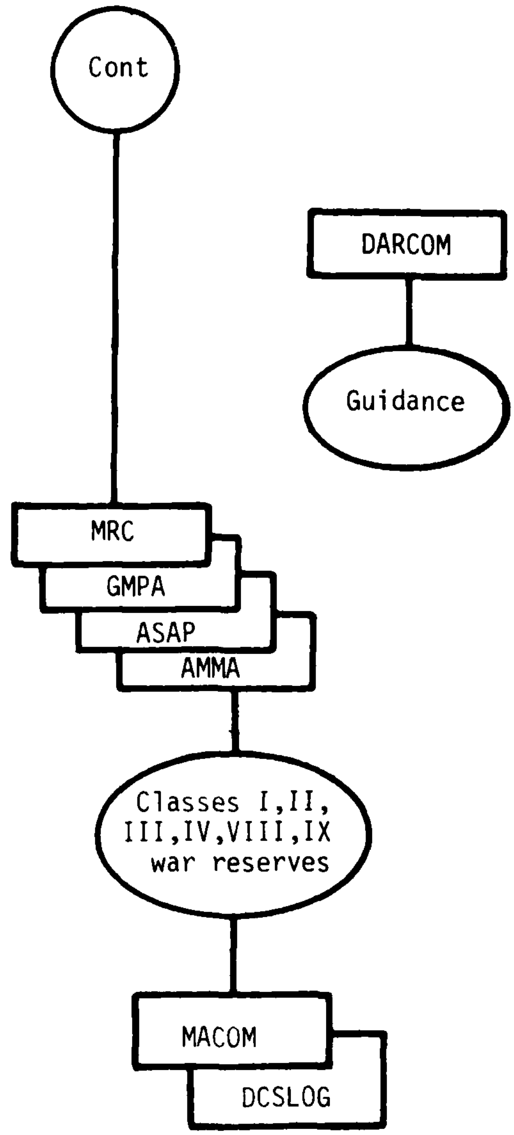
3-5. WAR RESERVE REQUIREMENTS. The US Army Depot System Command uses the distribution or initial LOGSACS as primary input in developing the Total Army Equipment Distribution Program (TAEDP). During the production of the TAEDP, Major Item (Class VII) war reserve distribution requirements are computed. Separately, ammunition (Class V) war reserve requirements are computed. Extracts of the LOGSACS indicating units, equipment densities, and deployments for each scenario are provided to the DARCOM Materiel Readiness Commands (MRC) and Service Item Control Centers (SICC) for their use in computing secondary item war reserve requirements for the other classes of supply (see Appendix G).

DCSOPS prepares a LOGSACS tape based on the initial program force and distributes it to DESCOM.

Under guidance of DCSLOG, DESCOM prepares the Total Army Equipment Distribution Program (TAEDP). In determining total major item distribution requirements, DESCOM computes major items (Class VII) war reserve requirements. DESCOM also computes ammunition (Class V) war reserve requirements and provides to DCSLOG and DARCOM MRCs.



DESCOM extracts Equipment Required Data (ERD) from the LOGSACS and Equipment Density Data (EDD) from the Asset Balance File and distributes it to DARCOM Materiel Readiness Commands and SICC. MRC and SICC compute secondary item war reserve requirements as directed by guidance from HQ, DARCOM and provide results to major commands and DCSLOG for budget preparation.



CHAPTER 4

ANALYSIS AND ASSESSMENT

4-1. INTRODUCTION

a. Chapter 3 and its supporting appendices described, the step-by-step development of the Army's wartime requirements for force structure, personnel, and equipment. This chapter presents, an analysis of that process, including the identification of imbedded and externally introduced inconsistencies and other problems which should be considered for correction.

b. The ultimate purpose of the requirements determination process is to estimate, as accurately as possible, the total quantity of equipment and personnel necessary to fully outfit the Army's approved force structure in peacetime and to provide those essential war reserve stocks and replacement personnel necessary sustain this force in wartime from D-day through the period of time and at the level of support prescribed in the latest OSD guidance. If this estimate is to be credible, it is essential that the process which produces it be as consistent as possible.

4-2. GENERAL OBSERVATIONS. A number of general observations can be made about the requirements determination process currently being used by the Army.

a. The process consists of several interrelated, but largely independent, subprocesses with no clearly defined overall control, coordination, or integration.

b. While the process produces usable statements of Army requirements for forces, personnel, and equipment, the credibility of these statements is degraded by inconsistencies either imbedded in the process itself or introduced into the process through conflicting guidance.

c. Actions to eliminate these inconsistencies are underway in most problem areas, but the lack of overall control of these efforts reduces their effectiveness.

d. There is a clear need to align the component parts of the process more effectively and establish a means of overall management and control which will introduce more stability and credibility into Army requirements determination.

4-3. IMPACT OF THE INTEGRATED BATTLEFIELD. The current requirements determination process is dominated by one overriding assumption, that the conflict on which the requirement is based will be a conventional conflict. Requirements for tactical nuclear weapons and chemical munitions have historically been determined by separate, off-line studies utilizing completely different scenarios and basic assumptions.

Because of the independent nature of these efforts, they have not been included in this review. However, it should be recognized that recent guidance from the Chief of Staff has created a requirement for the analytical community to seek methodologies which can address the employment of nuclear and chemical weapons on an integrated battlefield. The Chemical School is currently developing a study program which will tie together the Army's effort to portray the integrated battlefield in all Army studies. CAA has recently completed a feasibility study which examined several alternative methodologies for computing ammunition and equipment consumption rates in an integrated theater war and is making preparations to conduct such a requirements study in FY 83. Another CAA study is attempting to define credible integrated scenarios for use by the Army in assessing the impact of an integrated war. Because of the current incomplete nature of these efforts their impact on the consistency of the requirements determination process cannot be gauged at this time. It is likely that the introduction of the integrated battlefield as the basis for all requirements determination will create the need for a careful review of the process to determine what changes need to be made to adequately address the expected significant increases in post-D-day consumption of personnel and equipment.

4-4. SUPPORTING ANALYTICAL STUDIES

a. Background

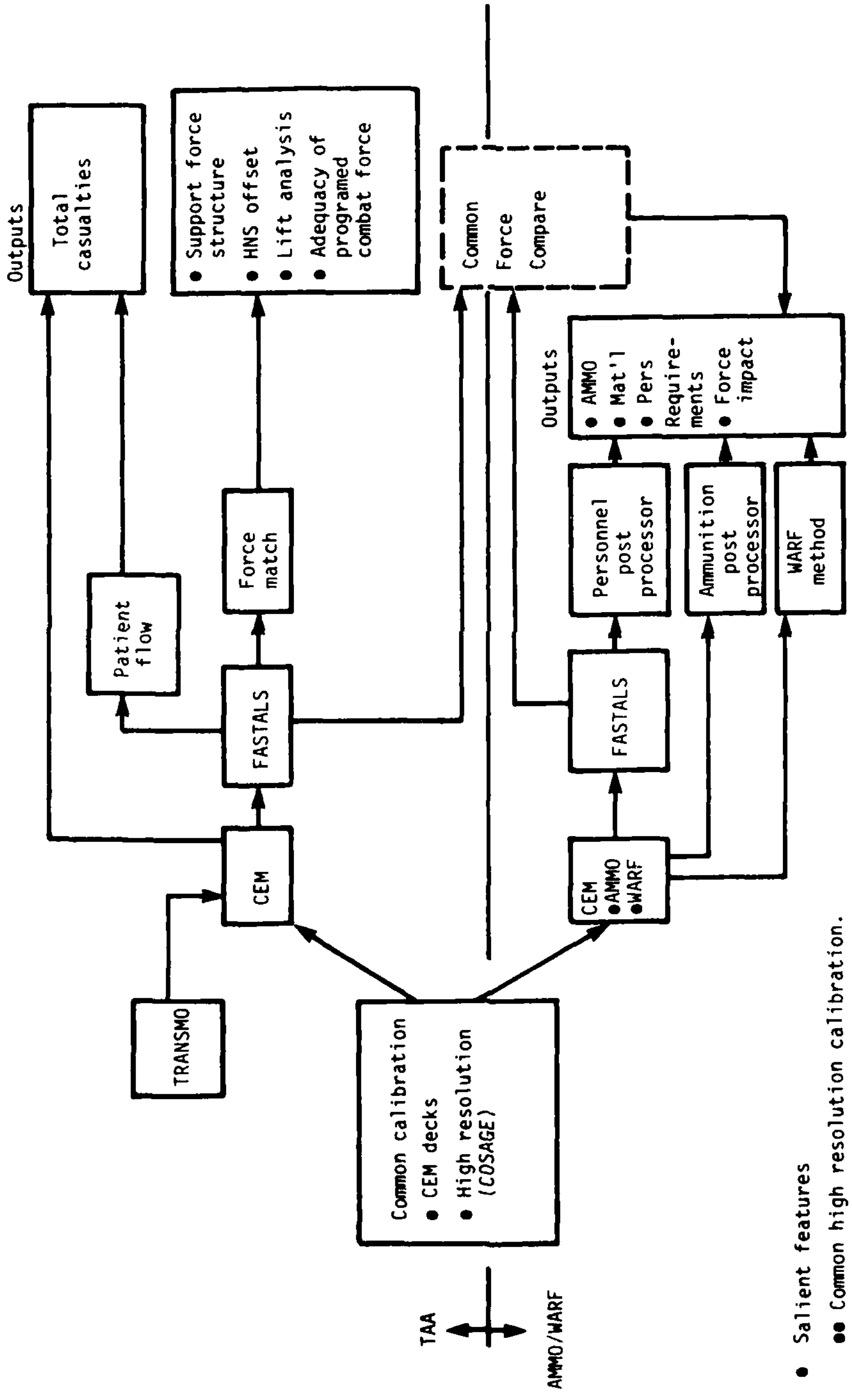
(1) The Concepts Analysis Agency supports the requirements determination process with two major studies each year, the Total Army Analysis Study (TAA) and the Wartime Requirements Study (AMMO/WARF).* The TAA Study simulates a theater war and produces a list of combat service support units required to round out the approved combat force and an estimate of the casualties. The AMMO/WARF Study also simulates a theater war and produces daily ammunition, equipment and, for selected vehicles, fuel consumption rates by time period for the same, or a similar, scenario to that used in TAA. These studies play an important role in the requirements determination process because they significantly influence the outcome of computations performed later on. The results of the TAA Study are fed into the process which develops the program force and

*Beginning with the AMMO/WARF P-88 Study (calendar year 1981), the AMMO/WARF methodology is being replaced by the Wartime Requirements for Ammunition, Materiel, and Personnel (WARRAMP) methodology. A detailed description of both methodologies is contained in Appendix D.

ultimately affect the composition of the PERSACS and LOGSACS. The consumption rates produced by the AMMO/WARF Study are used, in conjunction with the LOGSACS, to compute the post D-day consumption portion of the Army Acquisition Objective (AAO), described in paragraph 4-9. A detailed description of these studies and the methodologies used in their production is contained in Appendices C and D.

(2) Prior to the FY 87 POM cycle the AMMO/WARF and TAA Studies were conducted, for the most part, independently, with little consideration given to alignment or consistency between them. This was due primarily to the fact that the requirements for these studies came from different directorates in ODCSOPS and their results were used quite independently by the Army staff. For this reason, there was no deliberate effort to insure consistency in the techniques used in each study for calibrating the Concepts Evaluation Model (CEM), the theater level simulation model used to support both studies. In fact, the AMMO/WARF Study used detailed, high resolution gaming to develop killer/victim scoreboards as a means of calibrating the model for attrition while the TAA study used a mathematical technique involving firepower values for that purpose. These two techniques, which reflected different assumptions about how attrition should be determined, led to sometimes widely divergent results, even when the forces being portrayed were the same, or very nearly so. It was this lack of consistency between the TAA and AMMO/WARF Studies which originally led to the allegation made in the OSD Sustainability Study that the Army was guilty of using inconsistent planning factors and assumptions in developing its requirements for ammunition and equipment.

(3) During the FY 87 cycle, an effort was made to align the two studies by using the AMMO/WARF technique, high resolution gaming, to calibrate the CEM for the TAA Study. Since the FY 86 AMMO/WARF Study was still underway, and high resolution gaming with FY 87 forces had not been done, it was necessary to use high resolution data from the FY 86 AMMO/WARF Study for this purpose. While this was a step in the right direction, the difference in objective timeframes, FY 86 as opposed to FY 87, made the effort less than fully successful. For the FY 88 cycle, which began in December 1980, a plan was developed to fully align the two studies by using the same high resolution data to calibrate the CEM and by essentially simulating the same theater level war for both. The proposed procedure is illustrated schematically in Figure 4-1. To further ensure consistency, a single, joint data call for input data was issued for the two studies.



- Salient features
  - ●● Common high resolution calibration.
  - ●● Usual procedural steps retained.

Figure 4-1. Alignment of TAA and AMMO/WARF Studies

b. Insights

(1) While the TAA and AMMO/WARF studies are designed to support very different parts of the requirements determination process, there is a close relationship and similarity between them. Table 4-1 illustrates the similarity with respect to key assumptions and inputs. The only significant differences are in the way each treats ammunition and equipment constraints. In simple terms, the AMMO/WARF Study assures that sufficient support force structure is available to support whatever level of ammunition and equipment consumption is necessary to fight the war and then determines the consumption rates. The TAA Study begins with a fixed amount of ammunition and equipment and then unconstrains the support force structure to determine what units are required. Since, during the AAO computation, the rates from the AMMO/WARF Study and force structure (IIQ) from TAA are combined to produce required quantities of ammunition and equipment to support post D-day consumption, it seems prudent to make these studies as consistent as possible. This is the principal reason for attempting to align the two studies.

(2) To successfully accomplish alignment of the two studies, it is necessary that forces (including equipment densities), scenarios and CEM calibration techniques be consistent. The WARRAMP methodology with its Combat Sample Generator (COSAGE) high resolution model makes common CEM calibration completely practical. However, avoiding differences in scenario and forces is more difficult, and this problem is a major source of inconsistency in the current requirements determination process. The pressure for differing scenarios arises from differing assessments of which scenario is best suited for accomplishing the purpose of each of the two studies. Sponsors of the TAA Study believe that a scenario which stresses the force structure needs of the Army is more appropriate for their purposes. The sponsors of the AMMO/WARF Study believe that such a scenario will distort the ammunition and equipment consumption rates and argue for a different one. It may be that both sides are correct and, if so, consistency in this area of the requirements determination process will be impossible to achieve. Force differences on the other hand, result primarily from problems of timing. Figure 4-2 illustrates the most common problem. Because of the mid-year due date of the TAA study, data collection must start in December and January. Because force configurations are seldom firm at this time, the data provided are frequently based on speculation as to what the final version of the force will be. Since TAA must proceed, it has to use the best data available. However, by the time the AMMO/WARF process begins, the force has been firmed up and, historically, data inputs have been changed. Consequently, in an effort to be as accurate as possible, the AMMO/WARF Study uses the new data and is immediately out of alignment with TAA. Similar inconsistencies can be introduced by changing weapons effects or threat data after the process has started.

Table 4-1. Key Study Assumptions and Inputs - TAA and AMMO/WARF

	TAA	AMMO	WARF
• US Units Deploy at Full Strength	X	X	X
• Draft Replacement Stream	X	X	X
• Filters Constrained	X	X	X
• RC Combat Units Deploy after Active Combat Units	X	X	X
• Host Nation Support Assured	X	X	X
• US Weapons Constrained to Program Levels	X	X	
• US Weapons Unconstrained			X
• US Ammunition Constrained to Program Levels	X		
• US Ammunition Unconstrained		X	X
• NATO & WP Force Deployments	X	X	X
• Maintenance Capability for Both Forces	X	X	X
• Equipment Resupply Quantities for non-US NATO & WP	X	X	X
• TOE Structure of non-US & WP	X	X	X
• Scenario - Northern Attack Strategy	X	X	X
• Calibrating of Model by High Resolution Gaming	X	X	X
• Close Air Incorporated	X	X	X
• Non-US NATO Ammunition Constrained	X	X	X

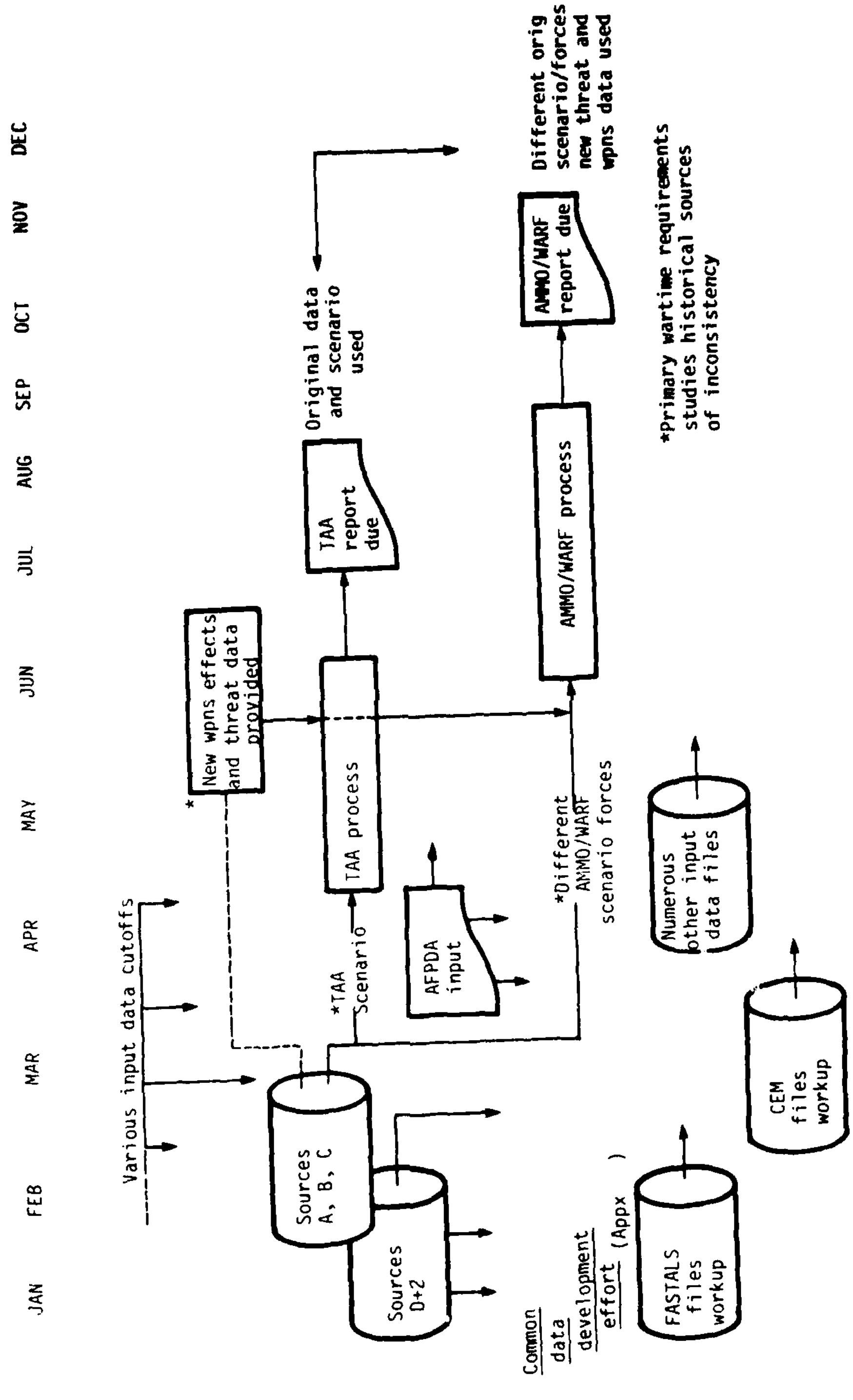


Figure 4-2. Sources of Inconsistencies in Wartime Requirements Studies

(3) Figure 4-3 shows another perspective on the timing problem and suggests some approaches to solving it. Here we see a projection of the requirements study cycle assuming common high resolution gaming and existing milestone dates. It is obvious that high resolution data collection and gaming must begin before final force decisions have been made. It is also clear that the due date for the TAA Study design case is a function of the time required for ARSTAF review and SACS production. Assuming that the 1 December POM LOGSACS date is firm and cannot be moved, then solutions to the timing problem must involve either reducing the time required for review of the design case and SACS production or completing force decisions earlier.

(4) The introduction of the WARRAMP methodology adds a significant degree of consistency to the overall requirements determination process. In addition to the improvements in accuracy, validity, and capability described in Appendix D, the fact that the wartime consumption rate of ammunition and equipment, the personnel casualty rate, and selected fuel consumption rates will all be based on the same theater level simulations will eliminate much of the imbedded inconsistency found in the earlier analytical methodologies.

c. Assessment

(1) The analytic tools are now available to minimize inconsistencies in the alignment of CAA studies. Given timely input data and a consistent scenario, the two major supporting studies of the requirements determination process can be aligned so as to produce credible and justifiable results.

(2) Obtaining the necessary input data early enough in the year to allow the alignment to be successful remains a problem.

(3) True consistency in the requirements determination process can never be achieved as long as each of these studies is driven by a different scenario. If consistency is considered to be important, a single scenario must be selected for POM development.

4-5. FORCE STRUCTURE

a. Background. JSPDSA I provides the strategy and force planning guidance for force analyses. In addition, Part I includes JCS strategy and force planning guidance for use as excursions from Defense Guidance (DG) in cases where the DG is incomplete, restrictive, or fails to address potential situations. Army participation in JSPDSA I begins with the consideration of the latest Defense Guidance, National Security Council Memoranda, and other available Presidential, SECDEF, JCS, and Army Chief of Staff guidance. The Services participate in a series of reviews and meetings through the joint review procedure.

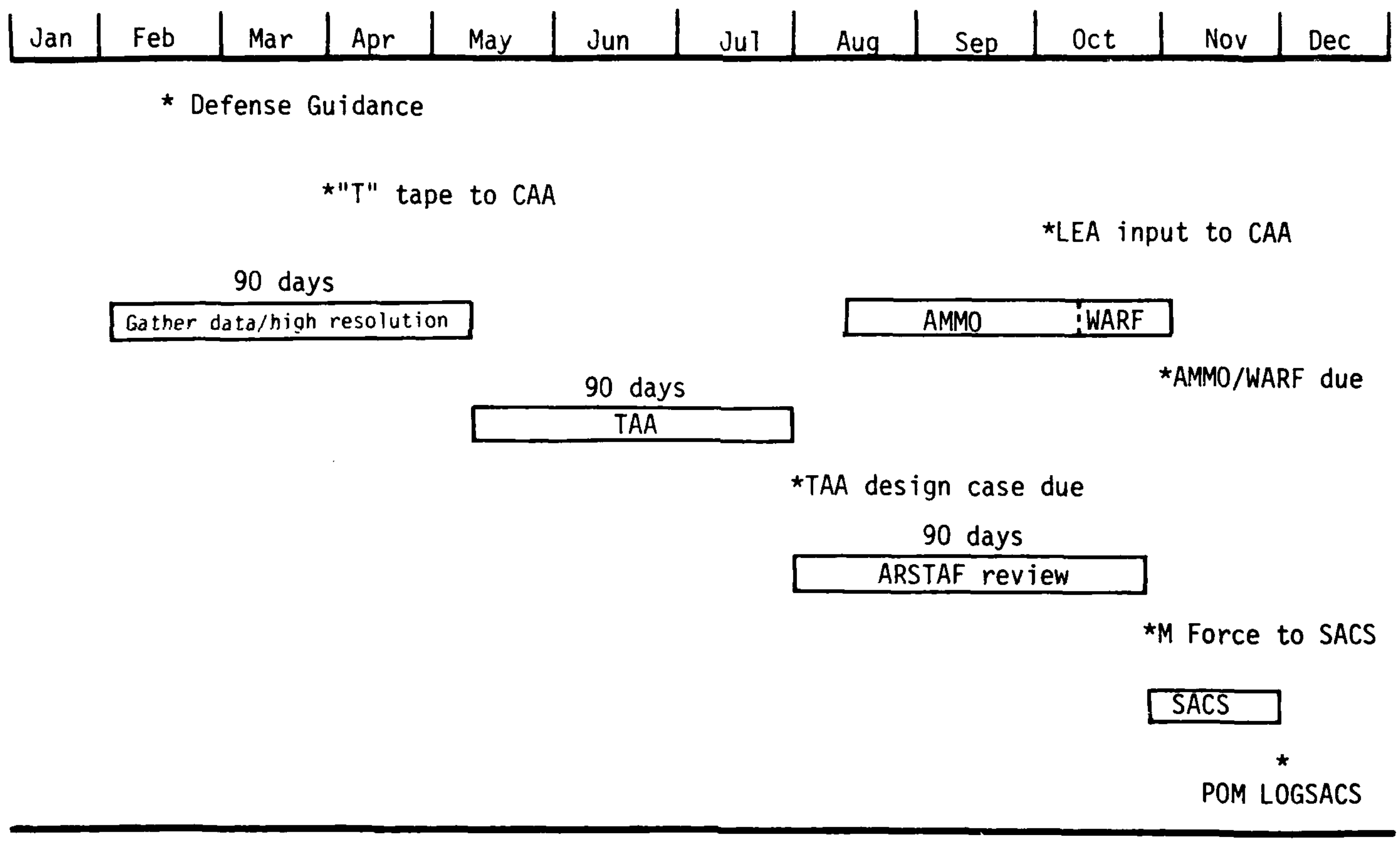


Figure 4-3. Wartime Requirements Studies Cycle

(1) Planning Force Development. Using JSPDSA I as guidance, Army component commanders of unified commands and the ARSTAF develop minimum risk forces. In addition, the ARSTAF develops a recommended Army planning force. Minimum risk forces provide a high assurance of executing the national military strategy successfully in specified scenarios. These scenarios are also used for program force sizing and structuring. The minimum risk forces, simultaneous conflict scenarios, judgments of allied capabilities and resolve, a reevaluated threat definition, projected force mobility and flexibility, and modernization capabilities are used to formulate the planning force; that force is designed to accept an increased level of risk.

(2) Program Force Development. The program force development process is illustrated in a descriptive diagram at Chapter 3, paragraph 3-2. In general, it is a process by which:

(a) A combat force is obtained from Army planning, through the Directorate of Strategy, Plans and Policy, ODCSOPS.

(b) Combat support units are added to the force by the Force Development Directorate, ODCSOPS. Combat service support units, which are required doctrinally, are added as a result of a combat simulation that is conducted by CAA.

(c) The resultant total force is reviewed by the ARSTAF to provide a program force which is balanced and attainable.

(d) The program force, sometimes referred to as the Master (M) Force, is "frozen" in the Force Development Management Information System (FDMIS) and released to the ARSTAF for program development in late October.

b. Insights

(1) The orientation of the minimum risk and planning force development stages differs from that of the program force development stage. The minimum risk and planning force stages are requirements oriented; that is, the forces generated reflect the capability required to satisfy force planning guidance. The minimum risk force is a rough estimate that is derived without considering resource cost. This estimate is subsequently refined by altering the guidance, by assuming a substantial national commitment over 10 years, and by specifying the types of units (combat, combat support, combat service support) in the force structure. The result is the planning force that has the capability to execute the complete strategy. The orientation is different in the program force development stage where the emphasis is on resource availability. The manpower and funds that are expected to be available to buy capability in 5 years are added to the force development guidance. Those resources are prescribed by OSD and are below those required to support the planning level. The planning force must be decremented to be feasible within resources; the result is the program force.

(2) The design case, formulated by CAA to support the POM, is the first step in development of the total program force. This "first cut" force is doctrinally balanced and provides a detailed picture of the force required upon mobilization.

(3) The design case is modified by the ARSTAF based upon comments of the MACOMs, priorities of the state National Guards, fiscal constraints, recruiting realities, changing doctrine, and emphasis of the leadership of the Army.

(4) Even though military police or engineer units currently in the National Guard may exceed Army requirements, state governors have real and valid reasons for retaining them.

(5) While graves registration units are required by the Army, it is very difficult for the Army Reserves to recruit personnel to fill this type of unit.

(6) At each step of the refinement, the force becomes progressively closer to that which is currently attainable.

(7) Fiscal, recruiting, and political reality and Army Staff emphasis on a specific capability are the primary factors responsible for changes to the design case.

(8) A lack of dedicated computer support causes the program force refinement to take longer than it otherwise might.

c. Assessment

(1) The force structure development process is basically sound in the manner in which it functions in support of the POM.

(2) The uncertainties, due to lack of an audit trail, involved in the ARSTAF adjustment of the design case have the potential to inject unquantifiable inconsistencies into the force structures.

(3) Consistency would be enhanced by complete, timely data collection and a uniform, coordinated scenario.

(4) The program force refinement process would be less time consuming, thus more efficient, with more responsive computer support.

4-6. PERSONNEL

a. Background. Wartime requirements for personnel, not including the CONUS base requirements, are separated into two distinct categories, those personnel needed to man the program force and those needed as replacements after initiation of hostilities.

(1) The PERSACS process is a method by which the personnel requirements of the program force are generated. The process involves computing requirements according to approved documents in the Army Authorization Document System (TAADS) and Table of Organization and Equipment (TOE). Training and recruiting requirements are produced from the PERSACS. Detail of this process is discussed in Appendix E.

(2) The number and MOS of personnel required after the onset of hostilities is determined by the number and specialty of personnel who become permanent casualties. The permanent casualty figures are determined through computer simulation during the conduct of the Total Army Analysis (TAA) Study.

b. <u>Insights</u>

(1) As illustrated in Appendix E, the PERSACS, unlike the LOGSACS, does not allow for revision and update of personnel figures based upon Basis of Issue Plans (BOIP) or Shorthand Notes (SHN). The manpower implications of proposed equipment changes are thus not projected in the PERSACS. The number of unprojected personnel will clearly vary between interactions of the PERSACS depending on the type and number of BOIP changes and shorthand notes applied to the corresponding interaction of the PERSACS. The minimum adverse effect of this procedure is that the personnel requirement lags the equipment and personnel requirement by at least one SACS cycle. The significance of this disconnect is not quantifiable in that the importance of the omitted personnel depends on the type of unit altered.

(2) Permanent casualties, as generated by TAA, are, for all but divisional KIA, MIA, and WIA, a product of patient admission rates provided by The Surgeon General. The rates used in TAA are significantly lower than those listed in FM 101-10-1, Change 1, dated 10 February 1978. The patient admission rates for Disease and Nonbattle injuries (DNBI) and nondivisional wounded in action (WIA) used in TAA, published yearly in AFPDA, are provided by the Office of The Surgeon General. The DNBI and nondivisional WIA admission rates are derived from historical medical data from World War II and the Korean War. Generally speaking, this is an accounting process whereby the historical hospital admissions for varying types of injuries are counted and divided by the number of personnel in given area on that day. This yields a hospital admission rate. This rate, expressed as a rate/1,000 personnel/day, is then reviewed, updated through a judgmental process, and published for use in studies.

(a) Permanent casualty figures not only drive the requirements for replacement personnel, but also requirements for hospitals, medical personnel, medical units, medical supplies, and personnel processing units.

(b) A casualty estimation study is currently in process at CAA. This study should provide a better methodology for estimation of casualties.

(3) The WARRAMP methodology, described in Appendix D, will also produce casualty data, but with the added advantage that the losses will be stratified by MOS, improving their usefulness. In addition, these casualty figures will be based on the same theater simulations which produces ammunition and equipment consumption rates, making them inherently more consistent as far as the overall requirements determination process is concerned.

c. Assessment

(1) The PERSACS would support a more accurate determination of recruiting and training requirements if BOIP and SHN were applied to the basic SACS before the PERSACS was produced.

(2) The patient admission rates currently used in TAA can neither be objectively justified nor conclusively shown to be inaccurate.

(3) The results of the ongoing Casualty Estimation Study should dispel reservations about the use of any specific admission rate and should be employed in all Army studies which are used in determination of required force structure or personnel requirements.

4-7. LOGISTIC PLANNING FACTORS

a. Background

(1) Wartime requirements for the varying classes of supply are a product of computer simulation. The primary inputs to the studies which produce these requirements are logistic planning factors, scenarios, Red and Blue forces, and intensity of conflict. Logistic planning factors are selected, valid multipliers used to estimate amounts and types of effort or resources for a proposed operation, and can be expressed as rates, ratios, length or time, or consumption quantities.

(2) A distinction should be made here between planning factors, as discussed in this section and Appendix F, and the equipment, ammunition and fuel consumption rates produced by the AMMO/WARF Study. Logistic planning factors tend to be broad estimates of average theater usage of various commodities or resources, while the consumption rates produced by the AMMO/WARF Study are more precise and specific estimates based on simulation of combat. For example, ammunition usage is expressed by a planning factor in terms of pounds per man per day, with no further detail as to ammunition type. By contrast, ammunition rates, as produced

by the AMMO/WARF Study, express ammunition usage in terms of rounds per firing tube per day, with separate rates being produced for each selected ammunition type. In fact, ammuntion rates are used in the development of the more aggregated logistic planning factors for ammunition usage.

(3) Management of logistic planning factors requires close coordination between the central manager and the various Army proponents for logistics concepts, doctrine, data, and consumption rates to determine the methodologies and quantitative information appropriate to the requirements process. Responsibility for management of logistic planning factors is soon to be centralized at the US Army Logistic Center (USALOGC) with the Commander, US Army Training and Doctrine Command, acting as the Executive Agent for the Deputy Chief of Staff for Logistics, HQDA. Logistics planning factors methodology is illustrated in Appendix F.

(4) Responsibility for central management of scenario input to the various requirements studies has not been fixed.

b. Insights

(1) Development of logistics planning factors involves calculations and estimations of parameters used to predict requirements in the five major functional areas of logistics: supply, maintenance, transportation, services, and facilities.

(2) These centrally managed factors are to be used by Army elements concerned with planning resources for operations, force structure, MACRIT and TOE development, war games, models, training exercise, and other analysis efforts.

(3) Identical logistic consumption factors are used in the TAA and AMMO/WARF Studies within a given year; however, they vary from year to year as normal policy and doctrine decisions are made within the requirements system.

(4) Consumption factors used in TAA and AMMO/WARF are more detailed than the theater averages in that they are expressed for 28 different types of units.

(5) Logistic planning factors methodology, as illustrated in Appendix F, appears to be well thought out and consistent.

c. Assessments

(1) Centralized management of logistic planning factors under the direction of the DCSLOG has the capability to provide greater accuracy, efficiency, and consistency to the requirements determination process.

(2) This centralized logistic data management concept provides a useful model upon which to base management of other categories of data used in the requirements determination process.

4-8. STRUCTURE AND COMPOSITION SYSTEM (SACS)

a. Background. It would be difficult to overestimate the importance and criticality of the SACS in the determination of Army requirements. It ties together the requirement for forces, personnel, and equipment and is used as a source document, in one form or another, in all parts of the process. Precisely because of its key role, its impact on those parts is crucial. There can be no consistency in the determination of requirements unless there is consistency between the SACS and the rest of the process. The SACS is described in Appendix E.

b. Insights. The centrality of the SACS in requirements determination makes it essential that the system be fully capable of supporting the process in a timely and effective manner. The SACS, while capable of producing the output products required to support the manning and equipping of the Army, still has shortcomings which contribute to inconsistencies in the overall requirements determination process. The most significant of these are its lack of an on-line capability and resulting excessive production time, and its lack of a capability to effectively handle the introduction of modernized equipment into the force.

(1) The SACS is a network of computer programs and input data files which produce a summation of the manpower and equipment requirements to outfit a selected force. It is not a data base. Each SACS output is a one-time product and is not subsequently updated. These outputs are produced in a sequential procedure involving a series of complex matches and merges of input data files which results in one integrated detail file. Because this procedure requires a significant amount of human intervention utilizing hard copy outputs, the production of the final SACS output file is a time-consuming process. Under good conditions, it can take as long as 5 weeks to complete the development of a product. This delay has several impacts on the requirements determination process which can adversely affect its overall quality and consistency. First, the time required to produce a SACS shortens the time available for other steps in the process. This tends to introduce error by requiring those steps to be rushed or shortcuts to be taken. Second, the delay increases the use of shorthand notes, which are used to incorporate equipment decisions when there is not time to adjust input files. Since shorthand notes affect only the output of the SACS, there is always the chance that changes might never be posted to the proper input files. Third, the lengthy SACS procedure eliminates the possibility of any rapid response to unforeseen questions or requirements.

(2) The most significant shortcoming of the present SACS system in terms of its effect on consistency in the determination of requirements, is its lack of an effective capability to reflect the time-phased introduction of new equipment into the force structure. When a Basis of Issue Plan (BOIP) is applied to the basic SACS, the effective date of the introduction of the new item across the entire force is based on an initial operational capability (IOC) of the first unit to be equipped. This results in a complete across-the-board change in the total requirement for the new item as of that date, even though the item is actually present in only one unit at that time. This artificiality has a significant impact on the computation of the Army Acquisition Objective (AAO), including distortion of the total requirement for ammunition and equipment (see discussion of major items below). This problem is recognized, and there is currently a contractual effort underway to develop an enhancement to the BOIP update program which is expected to correct this deficiency.

c. Assessment

(1) In its present configuration, the SACS is too cumbersome, lacks the degree of flexibility and responsiveness it should have, and cannot handle equipment modernization over time. To eliminate these shortcomings would require a major updating and redesign of the entire system.

(2) The time required to produce a SACS reduces the time available for supporting analysis. This is particularly true with respect to the TAA analysis as discussed earlier. A faster running SACS system would contribute to a solution to the timing problem which is making alignment of the TAA and AMMO/WARF Studies at CAA difficult and is contributing to equipment mix and force inconsistencies early in the process.

(3) A capability to phase the introduction of new equipment in the SACS is essential to computation of a valid and credible Army Acquisition Objective.

4-9. EQUIPMENT - MAJOR ITEMS (SUPPLY CLASSES V AND VII)

a. Army Acquisition Objective

(1) The Army acquisition objective (AAO) is defined as the quantity of an item of equipment or ammunition required to equip the approved US Army force and sustain that force, together with specified allies, in wartime from D-day through the period prescribed, and at the support level directed, in the latest OSD Defense Guidance.

(2) The AAO computation is performed for ODCSRDA by the Research, Development and Acquisition Information Systems Agency (RDAISA) and utilizes data inputs from a wide range of sources. These inputs are shown schematically in Figure 4-4 and are described below.

(a) A Structure and Composition Systems (SACS) tape is received from DAMO-FDA on or about 1 December each year. This tape contains detailed information about each unit, both Active and Reserve, in the approved force. For example, unit establishment and termination dates, the initial issue quantity (IIQ) of TOE equipment and termination dates, TOE equipment required by line item number (LIN), identification of POMCUS units and POMCUS items, and a daily deployment schedule (arrival in NATO or SWA) is reflected for each UIC. In addition to TOE/TDA requirements, requirements for new items entering the Army's inventory are also included in SACS.

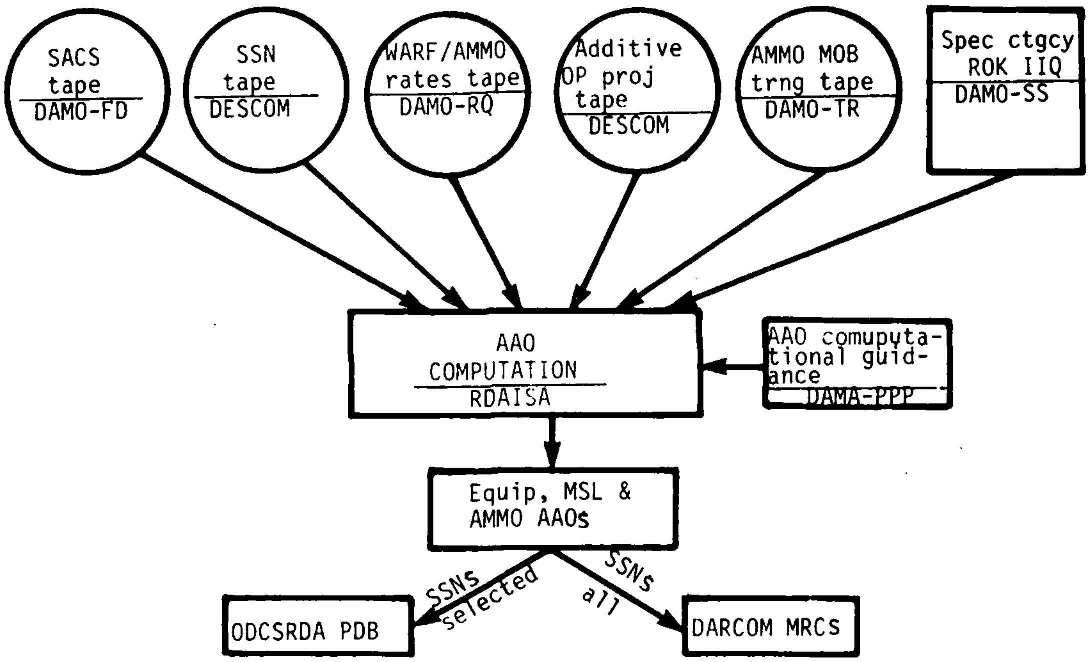


Figure 4-4. AAO Methodology

(b) A Standard Study Number (SSN) tape is received from Depot System Command (DESCOM) each November. This tape contains a cross reference of LINs to SSNs and SSNs to LINs. Also included in this tape are maintenance float, operational readiness float (ORF), repair cycle float (RCF) and peacetime replacment (PTR) factors which are used to compute mobilization consumption for each unit from D-day until it arrives in theater. The SSN tape also identifies the routing identifier code (RIC) for the materiel readiness command (MRC) controlling each item identified.

(c) A WARF/AMMO rates tape is received from DAMO-RQR on or about 1 December each year. This tape contains daily equipment loss and ammunition consumption rates in 15-and 30-day increments throughout the support period prescribed by DOD guidance. These rates are computed by the Concepts Analysis Agency (CAA) and are based on a detailed simulation of a prescribed NATO scenario. Also provided are rates for the Republic of Korea (ROK) Army which are used in the development of War Reserve Stock for Allies (WRSA) requirements.

(d) An Additive Operational Projects tape is received each November from DESCOM. This tape contains detailed equipment and ammunition requirements for DA approved additive operational projects which support special US contingencies.

(e) An Ammunition Mobilization Training tape is provided in November by DAMO-TR. This tape contains mobilization training requirements for ammunition items.

(f) Allied requirements data, which includes requirements for a special contingency stockpile (SCS) and ROK equipment IIQ, are received from DAMO-SSA in November of each year. SCS requirements represent the equipment and ammunition required to support allies in other than a NATO or Korea contingency and are authorized by the OSD Consolidated Guidance. The ROK equipment IIQ is used to develop WRSA requirements for equipment and munitions as indicated above. To avoid overstating the actual requirement, gross WRSA quantities are offset by those stocks on hand in Korea that are over and above the ROK IIQ.

(g) These varied inputs are tied together by the ODCSRDA AAO Computational Guidance. This guidance sets the length of the scenario, applies the rates and factors to specific portions of the force, and provides special guidance for the computation of AAOs for missiles and aircraft.

(3) The output of the AAO computation includes equipment, ammunition, and missile AAOs for each of the 5 POM years for all SSNs (7 to 8 thousand). These are provided by tape to the appropriate MRCs. In addition, AAOs for selected SSNs (approximately 1500 major items, missiles, and ammunition) for the last year of the POM are posted to the ODCSRDA procurement data base (PDB) for use in the development of the Army POM procurement program.

(4) As implied in the definition of the AAO, the AAO computation consists of a summation of all known and authorized requirements for major items of equipment and ammunition necessary to meet the current DOD guidance. In addition, the process stratifies these requirements in accordance with the force packaging concept. Figure 4-5 illustrates the principal components of the AAO and the composition of the prescribed force packages used in the FY 83-87 POM equipment procurement program.

(5) For each item of equipment or ammunition for which an AAO is to be computed, the computational methodology extracts quantity information from the input files described above and accumulates a total requirement for that item to satisfy all of the needs described in the computational guidance. For example, the quantity of an item required to initially equip all of the units in the total force is obtained by totaling the quantities of that item appearing in the required column of the LOGSACS for each unit listed. Float and war reserve quantities are obtained by multiplying the IIQ of the time by the factors provided in the SSN and AMMO/WARF tapes and totaling the results. However, the process is actually far more complicated than that, for it is also necessary for the methodology to keep track of when these requirements occur over time, from D-day to the termination of the support period specified in the guidance, as well as to properly group the requirements into force packages. This is accomplished by performing the computation on a day-by-day basis, picking up each unit as it arrives in theater, and computing its consumption from that day forward.

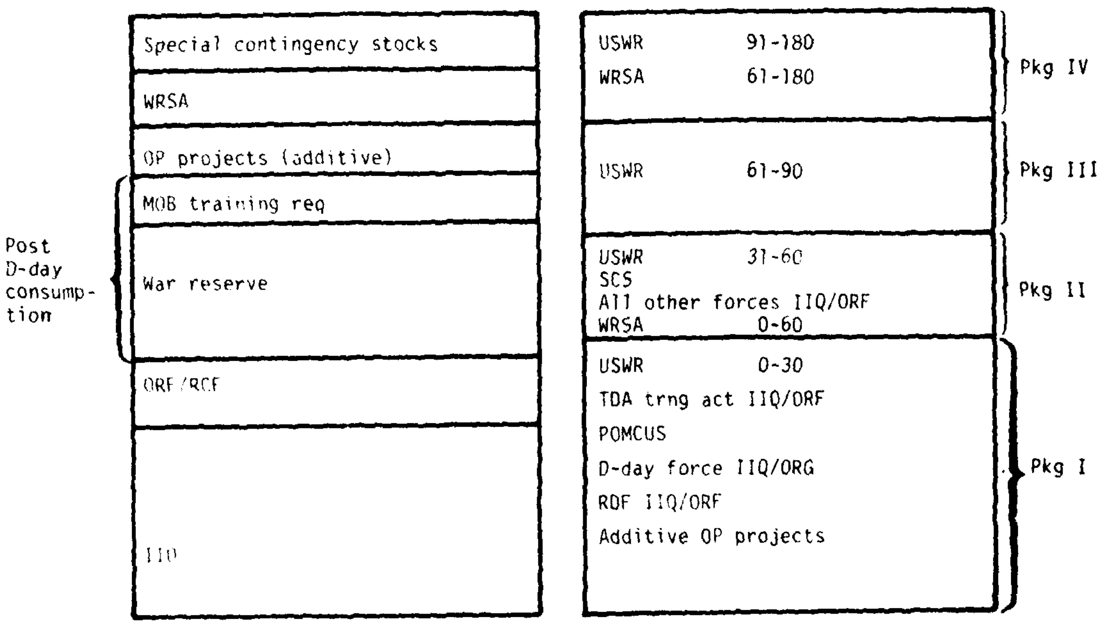


Figure 4-5. Army Acquisition Objective (AAO)

(6) It is obvious that the AAO computation is totally dependent on the equipment requirements and deployment data shown in the LOGSACS and the consumption and loss rates contained in the AMMO/WARF rates tape. Therefore, any inconsistencies which exist in either of these inputs, or between them, will have an impact on the computed requirements for major items (Class VII) and ammunition (Class V).

b. Insights

(1) The major analytical studies which drive the AAO computation are the AMMO/WARF "P" Study, which produces ammunition and equipment consumption rates, and the TAA warfighting analysis, which produces the support structure used in developing the LOGSACS. These studies are both conducted at CAA and, given consistent scenario and data inputs, will produce consistent results later in the process when the AAO is computed. However, if these two studies are not aligned, particularly with respect to scenario and combat forces employed, consistency of requirements will be degraded. In fact, the finding of the OSD Sustainability Study which criticized the lack of alignment of these two studies was the original reason this review was undertaken. Because of this criticism, CAA has made a major effort to align these two studies by using common CEM calibration and by preparing a single, joint call for input data. This effort is discussed in more detail in paragraph 4-4 above.

(2) Ammunition and equipment consumption rates are a function of the equipment densities played in the simulation and the way in which forces are introduced and employed on both sides of the conflict. In general, if the equipment densities change, or the mix of weapons systems change, then the rates change. Therefore, it becomes important to insure that the composition of the force against which the rates are applied is consistent with that of the force used in the production of the rates, or significant distortions of the requirement can occur. For example, it can be shown that the total number of artillery rounds needed in the first 30 days of a conflict in Europe is relatively constant from study to study, provided sufficient artillery pieces to fire the rounds are available. This is because total consumption early in a NATO war is a function of targets available. Assume that 4 million rounds are used. If the rates are based on an artillery density of 1,000 pieces, then those 4 million rounds will be fired at rate X. If a density of 800 artillery pieces is used, then the total would be fired at rate Y, somewhat higher. If, when computing the ammuntion requirement, rate X was used with a deployment schedule that only introduced 800 artillery pieces into the theater, the total ammunition requirement would be understated. The same principle applies to weapons mix. Tank loss rates for a force heavy in M1 tanks should be different from loss rates for a force with few M1 tanks. Consistent application of the rates is necessary if valid requirements are to be computed.

(3) This problem is exacerbated by the inability of the LOGSACS to effectively portray the introduction of new items of equipment into the force over time. When BOIPs are applied to the LOGSACS force structure, the effective date for the introduction of the new item across the entire force is based on an initial operational capability (IOC) of the first unit to be equipped. This results in a complete change in the total requirement for the new item throughout the LOGSACS as of that date, even though the item is actually present in only one unit at that time. This means that ammunition, war reserve, and float requirements for the total force will be based on the new item rather than the old item, in spite of the fact that the old item is still fielded in large quantities. This clearly distorts the total requirement. Because of this inability of the LOGSACS to show the actual mix of weapons in the force, another inconsistency appears. The AMMO/WARF Rates Study uses a weapons density which reflects the actual mix of systems expected to be in the force in the timeframe of the study and the consumption rates for ammunition and equipment are based on that mix. During the AAO computation, these rates are applied to the IIQ quantities which appear in the LOGSACS. But these IIQ quantities, as described above, do not reflect the same equipment mix as was used to develop the rates, but instead, reflect a different mix caused by the limitations of the BOIP application process. This also distorts the total requirement.

(4) Currently, ammunition and equipment consumption rates are produced only for conflicts involving US forces in Europe (NATO) and ROK forces in Korea, although rates for other theaters are needed, particulary the Middle East. War reserve requirements for all theaters are computed using the NATO rates, even though this obviously introduces error. CAA is currently developing the capability to simulate a conflict in the Middle East, and this capability, when operational, will contribute to more justifiable requirements. In addition, rates are not presently produced for all items requiring AAO computations. For example, consumption rates for air defense missiles are not computed as a part of the AMMO/WARF process, and separate guidance must be prepared by DCSRDA to govern the computation of AAO for these items.

c. Assessment

(1) The AAO computation process is sound, but its accuracy is dependent on the consistency which exists between the equipment densities contained in the LOGSACS and the consumption rates for ammunition and equipment produced by CAA. For the proper consistency to exist, the equipment densities shown in LOGSACS must be the same as those used to develop the consumption rates during the AMMO/WARF Study. This can only occur if the SACS has the capability to phase the introduction of equipment into the force over time.

(2) To the degree possible, all consumption rates should be based on the theater to which they are to be applied. Presently, due to lack of rates other than for Europe, some artificiality is being introduced into the computation of the AAO by applying rates to theaters to which they do not apply.

4-10. EQUIPMENT - SECONDARY ITEMS (SUPPLY CLASSES I, II, III, IV, VIII, IX)

a. Background. The determination of wartime requirements for secondary items is essentially the determination of the secondary item war reserve requirement. As outlined in Appendix G, what is needed is a measure of the difference between those stocks needed to maintain the Army in peacetime and those additional stocks needed to cover that period of time from D-day until the peacetime supply system can gear up to provide the increased demands. Whereas the peacetime stockage levels are based on user demand, the additional stocks needed in war are a function of the density of personnel and equipment to be supported and the expected increased usage of the item under wartime conditions. Consistency in this part of the requirements determination process is therefore directly related to the way in which these densities and usage factors are determined.

b. Insights

(1) The basic computational procedure for determining the requirement for each class of supply is described in Appendix G. This study did not research these procedures in great detail because a major effort is underway in DARCOM to develop a new standard computational procedure which will align the Army process with DODI 4140.47 and eliminate inconsistencies caused by the proliferation of unique procedures at each MRC. What is important, for our purposes, is the way in which any secondary item requirement computational procedure relates to the other parts of the requirements determination process in terms of consistency.

(2) It is clear that, at present, no direct linkage exists between the computation of secondary item requirements and the other parts of the process. Indirectly, the equipment and personnel densities used in the computations are based on the LOGSACS, but, in fact, the densities used are not the same as those used in the AAO computation, for example. This is caused by the inability of the SACS to apply a time-phased BOIP and accurately reflect the impact of equipment modernization over time. Because this capability does not exist, DESCOM has developed, as part of its Total Army Equipment Distribution Program (TAEDP), a computational module which can apply BOIP data over time and generate more accurate equipment densities. It is from this revised LOGSACS file that equipment and personnel density data is extracted and provided to the MRCs SICC for their secondary item requirements computation.

(3) Another inconsistency arises due to the basic orientation of the secondary items requirements process. DOD guidance has focused attention on the budget year of the POM period, and war reserves computations are based on that year. This contrasts sharply with the AAO for major items and ammunition which is oriented on the last year of the POM period. Secondary item requirements are developed for the other POM years, but this process tends to be an extension of the budget year

figures with adjustments for new items of equipment and inflation. There is currently no direct correlation with the major item requirements being determined in the AAO process. This budget year orientation results in another disconnect as far as the POM itself is concerned. Secondary item war reserve requirements are not computed by the MRC/SICC in time to be included in the POM submissions. Therefore, the POM requirements for secondary items are based upon last year's computation, with the updated figures being included in the budget submissions for the first time.

(4) In the area of combat usage estimates, the linkage is equally tenuous. In the computations of Class III (POL) requirements, for example, the present procedure utilizes combat operation profile information based on TRADOC estimates. CAA has developed a methodology for computing combat fuel consumption factors which is directly tied to the same combat simulations which generate ammunition and equipment consumption factors, and this methodology is being integrated into the WARRAMP methodology for determining wartime requirements for ammunition, equipment, and personnel. The CAA simulation-based factors should be utilized in the development of the TRADOC estimates, and the list of fuel consuming vehicles for which they are computed should be extended to the maximum degree possible. In computation of Class IX (repair parts) requirements, the combat usage factors are variously based on testing, TRADOC mission profiles, combat experience, and other sources. Recently, representatives of the Sustaining Predictions for Repair Parts for Combat (SPARC) Study at AMSAA, a study designed to estimate repair parts requirements caused by combat damage, investigated the feasibility of using combat loss data from CAA simulations to improve their estimates. This approach offers a possible way of achieving the linkage between the parts of the process which is needed.

c. Assessment

(1) The computation of secondary item requirements will be significantly improved with the implementation of the new DARCOM standardized procedure. As a part of that development, all combat usage factors will be reviewed and updated. The opportunity exists to achieve a substantial improvement in consistency throughout the requirements determination process if this effort were to be focused on selecting and/or developing factors which are directly related to the combat simulations which drive other parts of the process.

(2) At the same time, it is essential that the equipment densities used in these computations be consistent with those being used in the computation of requirements for ammunition and major items in the Army authorized acquisition objective process. This can only be achieved by building into the SACS the capability to portray equipment modernization.

(3) Secondary item requirements should be computed on the same basis as the other parts of the process. That is, they should be computed for all 5 years of the POM period, and the computations should be completed in time to be included in the POM submission. The proper alignment of these computations should be reviewed during the Phase II effort.

CHAPTER 5

CONCEPT FOR CONSISTENCY MANAGEMENT

5-1. GENERAL. It has been established that significant effort is already being directed toward eliminating inconsistencies in the Army requirements determination process, and the prescriptions contained in Chapter 6 of this report, if implemented, will extend and support that effort. However, there still exists a need to effectively manage the process to ensure future consistency and the study team was tasked to recommend a concept for exercising centralized management control and overview. This chapter outlines a feasible concept.

5-2. FOCAL POINT FOR CONSISTENCY MANAGEMENT. If consistency in the Army requirements determination process is to be assured, the prevailing tendency to deal with the various parts of the process independently and in isolation must be corrected. The directive of the Secretary of Defense which called for the naming of a single office in each service to be responsible for consistency clearly recognized this weakness in the current process. Without some centralized clearing house for scenarios, assumptions, methodologies, and input data, the potential for significant disconnects between the interrelated parts of the process will continue to be present and the tracing and explaining of the few unavoidable and justifiable differences which are present will be all but impossible. Therefore, the first and paramount requirement for effective consistency management is to clearly designate a single Army Staff focal point for consistency in all requirements determination. To be effective, this focal point must also be given clear authority to ensure compliance. This authority could come from an Army regulation or a Chief of Staff memorandum, but whatever the administrative procedure used, it should clearly state that the designated focal point is to be the final arbiter of all issues concerning consistency within the requirements determination process.

5-3. SINGLE REPOSITORY OF DATA. To simplify the task of ensuring consistency, a single document or data base which can serve as a repository of approved scenarios, planning data, and assumptions is required. The Army Force Planning Data and Assumptions (AFPDA), which is currently an annual study effort by CAA, could serve as the starting point for such a repository. However, to meet the requirements of consistency management, the format of the AFPDA would have to be revised, expanded, and elevated to directive status within the Department of the Army, with the designated focal point serving as its proponent. To be useful, it would have to be available early enough in the year to serve as input data for all studies supporting a given POM cycle. As is the case with similar documents, each edition of this document would remain in effect and be binding on all Army users until it was superseded by a new edition. Therefore, the currency and validity of the data in this document would be an important consideration. The objective would be to align the frequency of updates with the needs of the requirements determination process. Our review of the process indicates that an annual update would be acceptable for most data elements and, if consistency is the goal, there is virtue in freezing inputs so as to establish the Army baseline for an entire PPBS cycle. In those cases where higher level guidance creates significant changes and the Army finds itself in the position of being significantly out of line with what is required, selected within-cycle modifications could be made to the basic document as long as they were fully documented. In the final analysis, controlled and explainable inconsistency is not a problem. The problem has always been unrecognized and unjustifiable inconsistency. However, even these changes should be no more frequent than semiannually. To the degree possible, this document would contain all of the input data required to accomplish the principal requirements studies and would be updated routinely. In those cases where additional data were needed, it would become the responsibility of the proponent focal point to monitor the assembly of these data and assure their timely submission to the study agency. The development of this data repository should be a major part of the Phase II effort.

5-4. METHODOLOGY CONSISTENCY. The designated focal point would also be responsible for monitoring methodologies used in the process to ensure that they were consistent, keeping in mind that the choice of methodology should remain the prerogative of the analytic agency. As was pointed out in Chapter 4, there is some indication that the computation of secondary item war reserve requirements and the determination of ammunition and major item requirements are not fully synchronized, primarily due to the fact that ammunition and major item combat losses are based on combat simulation while the other calculations are only indirectly based on such techniques. However, if the effort, already initiated, to link repair parts requirements to CAA combat simulation results is aggressively pursued, these methodologies should converge. The function of the focal point would be to monitor this effort and coordinate its extension throughout the process.

5-5. CAA TASKING. Since CAA provides the majority of all analytical support to the requirements determination process, the focal point would serve as the principal interface between CAA and ODCSOPS. In this connection, the focal point would be responsible for coordinating all CAA taskings and monitoring the CAA workload in the requirements area. Consistency would be greatly enhanced if all requirements for CAA analytical support could be outlined in a single annual tasker, with its preparation and coordination among the supported ODCSOPS directorates being the responsibility of the focal point. This interface function would also extend to other agencies and activities providing analytical support to the process, such as LEA and DESCOM.

5-6. STABILITY

a. Throughout this report, it has been suggested that a key factor in ensuring consistency in the requirements determination process is the maintenance of stability in the system. This not only applies to the input data used in analytical studies but to the frequency of those studies as well. The existing process, including as it does both base case and excursion analyses each year, is always pressed for time. This continuous rush to meet the PPBS deadlines is itself a contributor to inconsistency and error. As an alternative, a 2-year cycle would appear to be far more useful, spreading the analyses out and allowing not only more time for true analysis of the results, but also permitting a wider range of options to be examined. Recognition of this fact has already resulted in proposals to reduce the frequency of AMMO/WARF rates studies and similar proposals relating to the TAA analysis have been discussed. These steps alone would improve the quality and consistency of the supporting analysis, but perhaps do not go far enough. What is missing is a clear recognition that the integration of near-term readiness requirements into program development is important. To achieve this recognition and provide a means of accomplishing integration of near-term requirements into the process, a 2-year cycle should be considered. In each 2-year cycle, the first year would be exclusively devoted to analysis and requirements determination in support of the Army program. This effort would be requirements oriented, keyed to a NATO-only scenario, and would provide rates and force structure inputs to support the Army's procurement program and other POM programs. The second year of each cycle would be exclusively devoted to capability analysis of contingency options in support of the RDF and the Army's near-term readiness. This would allow the Army to identify capability shortfalls and develop modifications to the program to correct them.

b. A 2-year cycle would have a number of attractive features, such as:

(1) Allowing more thorough analysis by making available more resources each year to do the job.

(2) Contributing to accuracy and consistency by eliminating some of the deadline pressures now present.

(3) Making it possible for the results of the contingency analysis to influence the following year's program.

(4) Permitting the development of a stable and consistent approach to requirements determination.

(5) Making it possible to have MACOM participation in the contingency analyses, if desired.

c. It is recognized that this brief outline has not considered all of the ramifications of such a radical change in the approach to program development. For this reason, it is also proposed that further study of this 2-year cycle concept be included in the Phase II effort.

CHAPTER 6

INCONSISTENCIES AND MANAGEMENT PRESCRIPTIONS

6-1. GENERAL. During the course of this study, inconsistencies within the requirements determination were identified and analyzed to determine what management actions at HQDA and subordinate commands would eliminate them or reduce their impact on the overall process. Each of these inconsistencies, in general, has an undesirable effect on the accuracy or credibility of the requirements estimates produced by the process. Seldom were these inconsistencies clean cut or unique to a single part of the process, but rather were interrelated and difficult to isolate. In the same way, it is difficult to match corrective actions to specific inconsistencies, since, in most cases, a single comprehensive corrective action, such as centralizing control of input data, will eliminate a number of inconsistencies throughout the process. This chapter summarizes the significant inconsistencies discussed in Chapter 4 and suggests prescriptive actions which should be taken to eliminate them.

6-2. INCONSISTENCIES. Table 6-1 lists the significant inconsistencies identified during this study with their principal causes, and provides a brief assessment of the effect these inconsistencies are having on the requirements determination process. Table 6-2 relates these same inconsistencies to the principal categories of requirements being determined in order to illustrate the interrelated, and sometimes extensive effect they have. Wherever an "X" appears in a column under one of the requirements categories, it means that that category of requirement is somehow distorted or has reduced credibility because of that inconsistency.

6-3. MANAGEMENT PRESCRIPTIONS. The prescriptions below are based upon an assessment of the requirements determination process as it presently exists with consideration given to improvement actions currently under way. They are not arranged in order of importance or priority but are organized to correspond to the major headings of the report.

a. Supporting Analytical Studies

(1) CAA should continue ongoing efforts to improve analytical methodology, particularly the development and implementation of WARRAMP and the alignment of the wartime requirements and total Army studies.

(2) ODCSOPS should take action to eliminate conflicting scenario guidance and inconsistent input data. A single respository for scenarios, assumptions and planning data would be very useful in this effort.

Table 6-1. Inconsistencies in the Requirements Determination Process (page 1 of 2 pages)

Inconsistency	Cause	Effect
Simulation in TAA and AMMO/WARF studies based on different scenarios	Different assessments of which scenario best accomplishes the purpose of each study	Rates and force structure not aligned when used in AAO computation; distorts AAO; casualties not aligned with equipment losses
Simulation in TAA and AMMO/WARF studies based on different equipment mixes and densities	Same as above; is also caused by late or changed data inputs	Rates and force structure not aligned when used in AAO computation; distorts AAO; casualties not aligned with equipment losses
CEM calibration of TAA and AMMO/WARF studies based on different high *resolution data*	High resolution input data late; TAA has to run with on-hand data; input data changes *after high resolution simulation begins*	Rates and force structure not aligned when used in AAO computation; distorts AAO; casualties not aligned with equipment losses
ARSTAF adjustments unbalanced support force structure	Constraints on personnel ceilings; political and other considerations	Support forces cannot be analytically justified; rates are not aligned with force structure when used in AAO computation
PERSACS does not include impacts of BOIP and SHN changes as does LOGSACS	PERSACS is completed before BOIP and SHN data is applied	Personnel requirements do not include results of equipment modernization
Patient admission rates in AFPDA and FM 101-10-1 are different	AFPDA rates are set deliberately lower than FM 101-10-1 rates for use in analytical studies	Personnel and medical equipment requirements are possibly understated

Table 6-1. Inconsistencies in the Requirements Determination Process (page 2 of 2 pages)

Inconsistency	Cause	Effect
Casualty estimates produced on different basis from ammunition and equipment consumption rates	Different scenario used for TAA and AMMO/WARF studies; casualty estimates produced by different *methodology* (TAA)	Personnel and equipment requirements are not aligned
Equipment densities in LOGSACS are not the same as those used in rates studies nor do they reflect the true densities in the force	Lack of capability to time-phased BOIP	AAO is distorted
Deployment schedules used in AAO computation are not the same as those used in rates studies	Use of different scenarios in TAA and AMMO/WARF studies	AAO is distorted
Post-D-day consumption for theaters other than Europe based on Europe rates	No rates computed for other theaters	AAO is distorted
Rates for *some items of equipment not* based on simulation; no linkage with rates studies	*No rates computed for some items*	AAO is distorted
Equipment densities used in secondary item requirements computations not the same as those used for AAO computation	Use of PEM impacted LOGSACS to develop density data	Secondary item requirements not directly related to major item requirements
Secondary item requirements based on first year of POM only	DOD focus is primarily on the budget year of POM	Same as above
Secondary item requirements in POM based on previous year's data	Timing of computational process	Same as above

Table 6-2. Effects of Inconsistencies on Categories of Requirements

Inconsistency	Force structure	Personnel	Major items	Secondary items
Simulation in TAA and AMMO/WARF studies based on different scenarios	X	X	X	
Simulation in TAA and AMMO/WARF studies based on different equipment mixes and densities	X	X	X	
CEM calibration of TAA and AMMO WARF studies based on different high resolution data	X	X	X	
ARSTAF adjustments unbalance support force structure	X		X	
PERSACS does not include impacts of BOIP and SHN changes as does LOGSACS		X		
Patient admission rates in AFPDA and FM 101-10-1 are different		X	X	X
Casualty estimates produced on different basis from ammunition and equipment consumption rates		X		
Equipment densities in LOGSACS are not the same as those used in rates studies			X	X
Deployment schedules used in AAO computation are not the same as those used in rates studies			X	
Post-D-day consumption for theaters other than Europe based on Europe rates			X	
Rates for some items of equipment not based on simulation; no linkage with rates studies			X	
Equipment densities used in secondary item requirements computations not the same as those used for AAO computation				X
Secondary item requirements based on first year of POM only				X
Secondary item requirements in POM based on previous year's data				X

b. <u>Force Structure Development</u>

(1) ODCSOPS should be alert to possible negative impacts of support force modifications and should document rationale for changes.

(2) Action should be taken by USAMSSA to provide dedicated computer support to ODCSOPS during program force development.

c. <u>Personnel Requirements Development</u>

(1) When WARRAMP methodology is operational, to include the personnel postprocessor, WARRAMP produced casualty data should be used in personnel requirements determination instead of TAA casualty data.

(2) The result of the CAA Casualty Estimation Study should be used as a basis for improving casualty estimation methodology.

d. <u>Structure and Composition System (SACS)</u>. ODCSOPS should reconsider the feasibility of redesigning the SACS to upgrade its capability and make it more responsive to the needs of the requirements determination process. As a minimum, this should include the capability to time-phase the application of BOIP to the force structure and to include the effects of equipment modernization in the PERSACS.

e. <u>Major Items and Ammunition</u>

(1) CAA should develop the capability to compute ammunition and equipment consumption rates for theaters other than Korea and Europe.

(2) CAA should develop the capability to compute rates for an expanded weapon list, particularly air defense missiles.

f. <u>Secondary Items</u>

(1) Efforts, already under way, to base the determination of requirements for secondary items more directly on combat simulations used to develop ammunition and equipment consumption rates should be accelerated.

(2) Secondary item requirements should be computed for all five POM years, and the computation schedule should be advanced to allow requirements to be included in the current POM.

g. Consistency Management

(1) A focal point office for requirements determination consistency should be established within ODCSOPS with full authority to ensure compliance. This focal point should:

(a) Develop and maintain a document or data base, having Army directive status, which contains a compilation of those scenarios, planning data, and assumptions which are to be used for all requirements determination purposes throughout a given POM cycle.

(b) Monitor consistency and compatibility of methodologies used to determine requirements.

(c) Coordinate all taskings to supporting analytical agencies in the requirements area.

(2) A 2-year analysis cycle should be adopted to increase stability in the requirements process.

h. Benefits. Table 6-3 relates these prescriptions to the inconsistencies identified in Table 6-1 and 6-2 and illustrates the benefits to be derived from their implementation. An "X" beneath a management prescription indicates that the action will assist in eliminating that inconsistency.

Table 6-3. Benefits of Prescriptions

Inconsistency	Improve methodology, align studies	Use single scenario	Document changes to support force	Use WARRAMP casualties	Redesign SACS	Document rates for other theaters and items	Link sec items to simulations and compute for 5 years	Centralize data	Adopt 2-year cycle	Monitor methodology
Simulation in TAA and AMMO/WARF studies based on different scenarios	X	X						X	X	
Simulation in TAA and AMMO/WARF studies based on different equipment mixes and densities	X	X			X			X	X	
CEM calibration of TAA and AMMO/WARF studies based on different high resolution data	X	X			X			X	X	
ARSTAF adjustments unbalanced support force structure			X							
PERSACS does not include impacts of BOIP and SHN changes as does LOGSACS					X					
Patient admission rates in AFPDA and FM 101-10-1 are different	X								X	
Casualty estimates produced on different basis from ammunition and equipment consumption rates	X			X						
Equipment densities in LOGSACS are not the same as those used in rates studies	X	X			X			X		
Deployment schedules used in AAO computation are not the same as those used in rates studies	X	X			X			X		
Post-D-day consumption for theater other than Europe based on Europe rates	X					X				
Rates for some items of equipment not based on simulation, no linkage with rates studies	X					X				
Equipment densities used in secondary item requirements computations not the same as those used for AAO computation					X		X		X	
Secondary item requirements based on first year of POM only							X			X
Secondary item requirements in POM based previous year's data							X		X	X

6-4. FOLLOW-ON WORK (PHASE II). To achieve a complete return on the work done in this study, additional follow-on work is required. In general, the follow-on effort should use the results of this study as a starting point and build upon them to further refine the requirements determination process. Three areas of study appear to be both suitable for follow-on work and likely to result in significant improvements in the overall consistency, effectiveness, and usefulness of the process.

a. Single Respository for Scenarios, Planning Data and Assumptions. Phase II should determine the form of this document (or data base) and the most effective way it can be implemented. This task would include a detailed review of the timing problem identified in Chapter 4 and the development of a feasible way to align all data inputs so that the process could utilize a single data source.

b. Near-term Versus Long-term Requirements. Phase I examined only the long-term, or outyear, requirements determination process. Phase II should explore approaches to solving the problem of how best to allocate resources so as to achieve maximum near-term readiness while building Army capabilities up to program requirements. This task would include an examination of how best to implement a 2-year analysis cycle.

c. Improved Methodology for Supporting Analytical Studies. Phase II should investigate the feasibility of combining the several methodologies now being used by CAA to support the requirements determination process into one highly efficient methodology which will provide increased consistency and resource economies.

APPENDIX A

STUDY CONTRIBUTORS

A-1. STUDY TEAM

a. Study Director

COL Norwood W. Fleming, Systems Force Mix Directorate

b. Team Members

LTC William J. Mayhew, ADPE Group
MAJ George R. Fischer
MAJ Gene P. Austin

c. Other Contributors

COL Richard K. Fickett, Requirements Directorate
COL Leslie G. Gibbings, Force Analysis Directorate
Mr. Wilbert Schwartzapfel

d. Support Personnel

Ms Carrie Allen, Word Processing Center
SP5 Rowen AmBery, Graphic Arts Branch
SSG Terry Barton, Graphic Arts Branch
Mr. Stanford Dennis, Graphic Arts Branch
Mr. Raymond Finkleman, Word Processing Center
Ms Joyce Garris, Word Processing Center
SP6 William Hartl, Graphic Arts Branch
Ms Rosaline Hill, Word Processing Center
Ms Nancy Lawrence, Word Processing Center
SSG Richard Loller, Graphic Arts Branch
Ms Anne Martin, Word Processing Center
Ms Judy Rosenthal, Graphic Arts Branch
Ms Geraldine Sabo
SSG M. F. Taamai, Graphic Arts Branch
Ms Pat Williams, Word Processing Center

A-2. PRODUCT REVIEW BOARD

Mr. John M. Tucker, Requirements Directorate
Mr. Fred R. Oberman, Systems Force Mix Directorate
CPT Thomas J. Teesdale, Joint Forces and Strategy Directorate

APPENDIX B

STUDY DIRECTIVE

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS
WASHINGTON, D.C. 20310

REPLY TO ATTENTION OF DAMO-RQR 3 DEC 1980

SUBJECT: Study Directive - Total Army Requirements Program - Phase I (TARP-I)

Commander
US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, MD 20014

1. REFERENCES.

a. DOD Sustainability Study Final Report, October 1979.

b. SECDEF Memo to Service Secretaries and Chairman JCS, dated 25 March 1980, subject: DOD Sustainability Study.

c. SA Memo to SECDEF, dated 27 June 1980, subject: DOD Sustainability Study.

d. DCSOPS (DAMO-ZD) Memo to DASD(MRA&L), dated 27 June 1980, subject: DOD Sustainability Study.

2. PURPOSE OF STUDY DIRECTIVE. This directive tasks Commander, Concepts Analysis Agency, to conduct the subject study within the terms of this directive.

3. STUDY TITLE. Total Army Requirements Program - Phase I. Short title: TARP-I.

4. BACKGROUND. The DOD Sustainability Study (Reference a) criticized the Army for using inconsistent assumptions and planning factors in determining wartime requirements for personnel, ammunition, and materiel. Reference b directed the designation of single office responsibility for consistency in these processes. References c and d appointed ODCSOPS as the responsible ARSTAF element and established the requirement for a review of Army planning factor sources, scenarios and methodologies used in wartime requirements determination in order to identify inconsistencies and recommend corrective action.

5. STUDY SPONSOR. HQ DA, ODCSOPS, ATTN: DAMO-RQR.

6. STUDY AGENCY. US Army Concepts Analysis Agency.

DAMO-RQR
SUBJECT: Study Directive - Total Army Requirements Program (TARP)

7. TERMS OF REFERENCE.

a. Problem. The Army must align the assumptions, scenarios and methodologies used for determining wartime requirements in order to eliminate inconsistencies in planning factor development.

b. Purpose. To conduct a review of the Army wartime requirements planning factor development processes and recommend appropriate actions to achieve and maintain consistency within the processes.

c. Objectives.

(1) Identify planning factors used to determine wartime requirements for personnel, support force structure, all classes of materiel, and the processes/methodologies used to develop them.

(2) Classify these processes/methodologies by category (ammunition, fuel, personnel, etc.), significance (major or supporting), and their dependence on, or contribution to, data developed by other processes/methodologies.

(3) Evaluate processes/methodologies for consistency in assumptions, models, scenarios, and inputs.

(4) Evaluate the interface between interdependent processes/methodologies.

(5) Identify inconsistencies and their causes and evaluate the impact of each on the wartime requirements determination process.

(6) Recommend corrective action, where appropriate, to eliminate significant inconsistencies in assumptions, inputs, models, scenarios, and processes/methodologies used for planning factor development.

(7) Recommend scope and required characteristics for a methodology for optimizing wartime requirements.

(8) Recommend a management concept through which centralized control and overview can be exercised.

d. Scope. Planning factor sources, scenarios and methodologies used to determine wartime requirements for all classes of supply, support force structure and personnel casualty replacements will be reviewed and manually aligned during Phase I. A follow-on effort, Phase II, will use the results of Phase I to develop procedures and methods for standardizing, disciplining, and optimally resourcing requirements. The scope, planning, and tasking of Phase II will be determined at the completion of Phase I.

DAMO-RQR
SUBJECT: Study Directive: Total Army Requirements Program (TARP)

e. Limitations.

(1) Detailed examination of model algorithms is not required.

(2) Study will concentrate on examination of processes/methodologies used to develop planning factors for use in the FY 83-87 POM.

(3) The development of the program combat force will not be reviewed.

(4) Studies which justify specific end items, e.g., COEA's, are not to be considered.

f. Time Frame. FY 83-87.

8. RESPONSIBILITIES.

a. ODUSA(OR), HQ TRADOC, ODCSPER, ODCSLOG, PAED, OTSG, OCE, OACSI, MD, and ODCSOPS (FD, RQ, OD, NC, SS, TR, ZD) will:

(1) Provide a member of the SAG.

(2) Provide guidance, data, and other expertise as requested by the study team.

b. ODCSOPS will:

(1) Establish a Study Advisory Group (SAG) IAW AR5-5.

(2) Provide the SAG Chairman.

9. ADMINISTRATION.

a. Milestones Schedule.

(1) 5 December 1980 - Finalize Study Plan.

(2) December 1980 - SAG Meeting to approve study plan.

(3) February 1981 - SAG Meeting, in-process review.

(4) 30 April 1981 - Complete review and provide advance copy of report.

(5) May 1981 - SAG Meeting, present report findings.

(6) June 1981 - Publish report.

DAMO-RQR
SUBJECT: Study Directive - Total Army Requirements Program (TARP)

b. Control Procedure. A Study Advisory Group (SAG) will be established. Interim reports will be furnished to the SAG as directed by the study sponsor.

c. Office/Point of Contact. DAMO-RQR (LTC Parks) is the point of contact for the study (telephone: 697-0421). For purposes of data collection, direct communication between CAA and the agency providing the data is authorized.

d. Coordination. This tasking directive has been coordinated with CAA IAW paragraph 4, AR 10-38.

GLENN K. OTIS
Lieutenant General, GS
Deputy Chief of Staff
for Operations and Plans

APPENDIX C

US ARMY TOTAL ARMY ANALYSIS (TAA)

C-1. DISCUSSION

a. The objective of the US Army Concept Analysis Agency annual Total Army Analysis (TAA) Study is to determine the time-phased requirements for combat service support forces necessary to sustain US programed Army combat forces in theaters prescribed by applicable scenarios, together with insights on the programed force warfighting potential.

b. The TAA is not a single simulation model or computational methodology that directly produces study results, but is rather a series of models and computational methodologies performed in supporting fashion. The study is conducted largely by personnel from organizational groups within CAA's Force Analysis, Joint Forces and Strategy, and Requirements Directorates.

c. Study results are provided to the Department of the Army Deputy Chief of Staff for Operations and Plans and other agencies for analysis of force structure requirements due to changing concepts, doctrine, threat estimates, strategies, plans, and constraints.

d. The TAA effort encompasses a full annual cycle of work for numerous key contributors and requires varying additional effort dependent upon the number, scope, and complexity of supplemental excursions performed from the basic study or as purely independent excursions.

e. Succeeding paragraphs of this appendix portray in greater detail:

(1) The overall study methodology and key computational steps.

(2) The types of major study data input and their sources.

(3) The types of key assumptions made.

(4) The sensitive parameters of the methodology.

(5) The study outputs.

C-2. METHODOLOGY AND KEY COMPUTATIONAL STEPS

a. The overall TAA study methodology, in simplified block format, is depicted in Figure C-1. Figure C-2 outlines the heart of the TAA methodological process in narrative format.

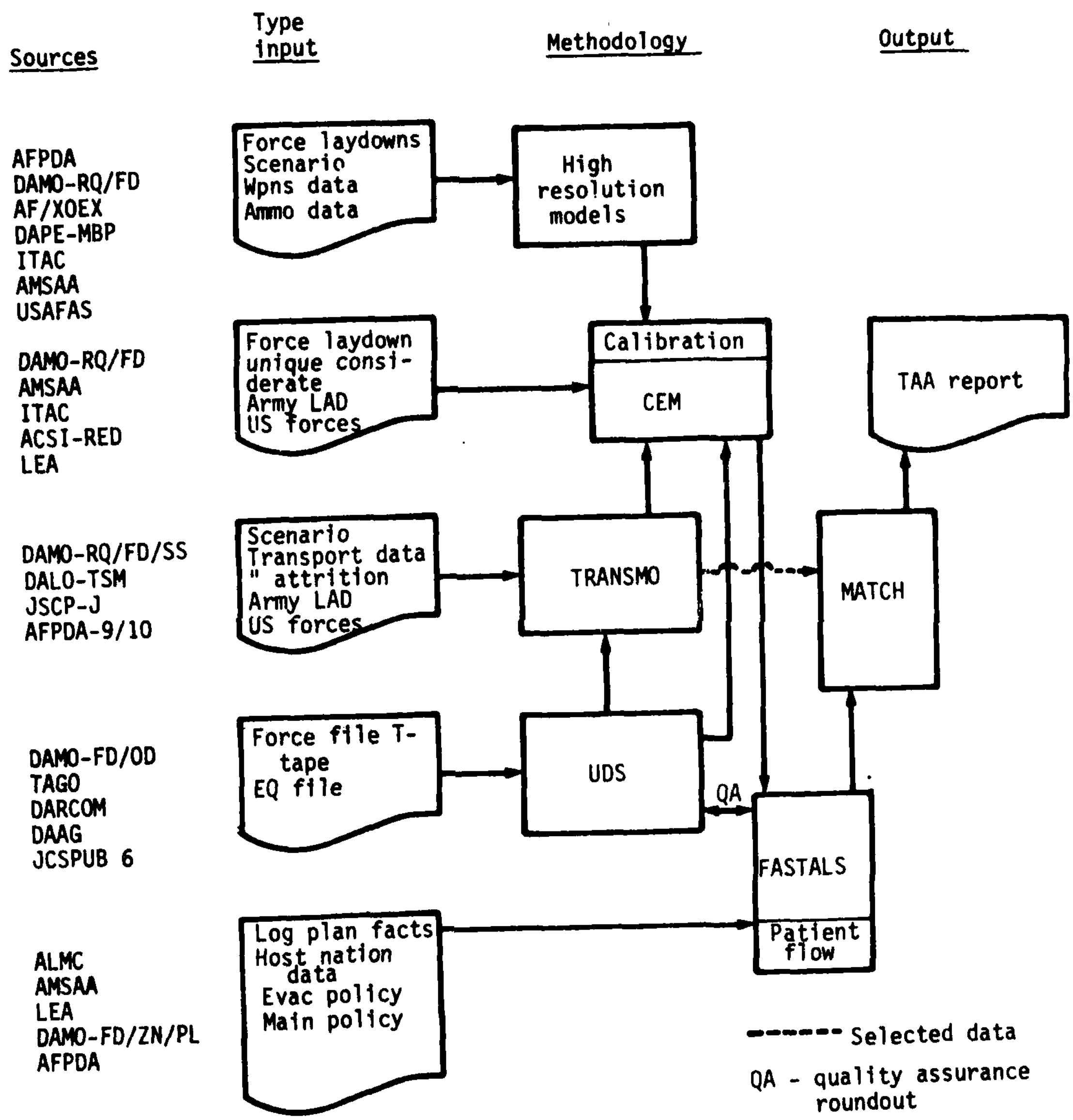


Figure C-1. Conceptual Outline of CAA Planning and Requirements Study - TAA

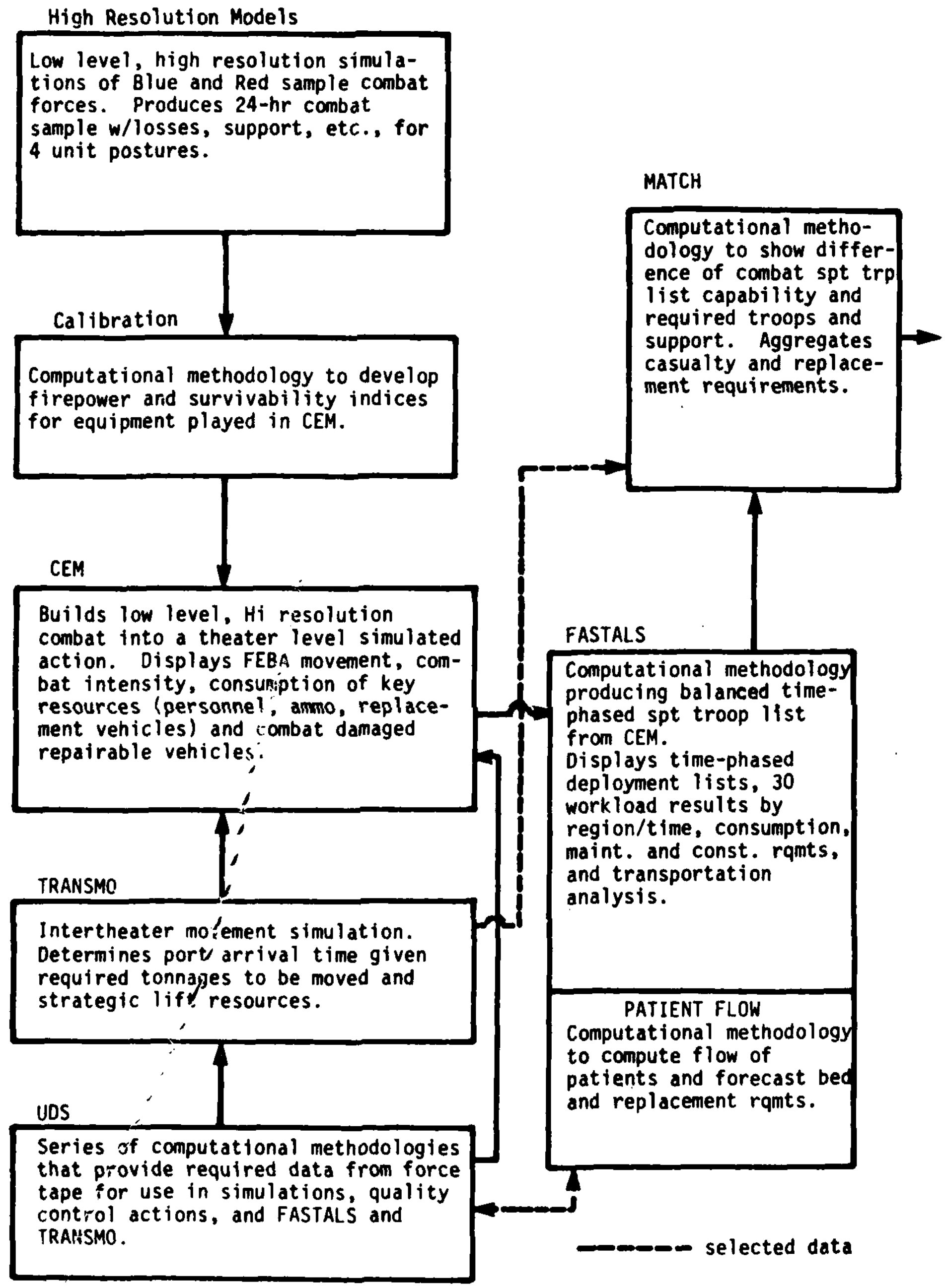


Figure C-2. Narrative Methodology - TAA

b. The study methodology is a logical sequence of:

(1) Assembling the forces from applicable approved intelligence source inputs and scenarios and the force tape (UDS, HI RES Models, CEM, and FASTALS input data).

(2) Simulating combat of the forces in low level (platoon/company), high-resolution models to gain precise force-on-force effectiveness. loss, and resource data which provide the basis for the conduct of a theater level engagement.

(3) Deploying forces to the theater (TRANSMO).

(4) Conducting the theater level engagement with reinforcement of forces and deployment resource requirements (CEM).

(5) Per requirements generated in the theater level action, total force support requirements are generated (FASTALS). Steps 3 to 5 are iterated for quality assurance as necessary.

(6) Data results are aggregated in draft force tapes and printouts are produced (MATCH) and ultimately applied to final report form.

c. The foregoing is an oversimplication of what is an immensely more detailed process. This overview is provided only to give insight to the rationale of the TAA process. Figure C-3 portrays the complexity of the interface leading to the patient flow process, one aspect of the FASTALS methodology that computes the flow of patients and forecasts hospital bed and replacement requirements.

C-3. INPUT AND SOURCES

a. A summarized portrayal of TAA input data and its sources was displayed in Figure C-1. If the Department of the Army Staff is considered as one single data source, the total of the TAA study input can be said to derive from approximately 11 separate agencies or primary source data documents (the 27 sources on Figure C-1 are grouped to 11). As in the case of the methodology overview, this listing is an oversimplification. The total of input data categories provided to the CEM alone are depicted in Table C-1. Each data category displayed may contain numerous data elements. Annex C-1 to this appendix is an extract of the TAA current working listing of data categories and sources used for conduct of the TAA (and P-series AMMO/WARF) analyses.

b. Data is approved and/or provided at specific calendar points commensuate with the need to start a given study and the desire and necessity to utilize the most current data available.

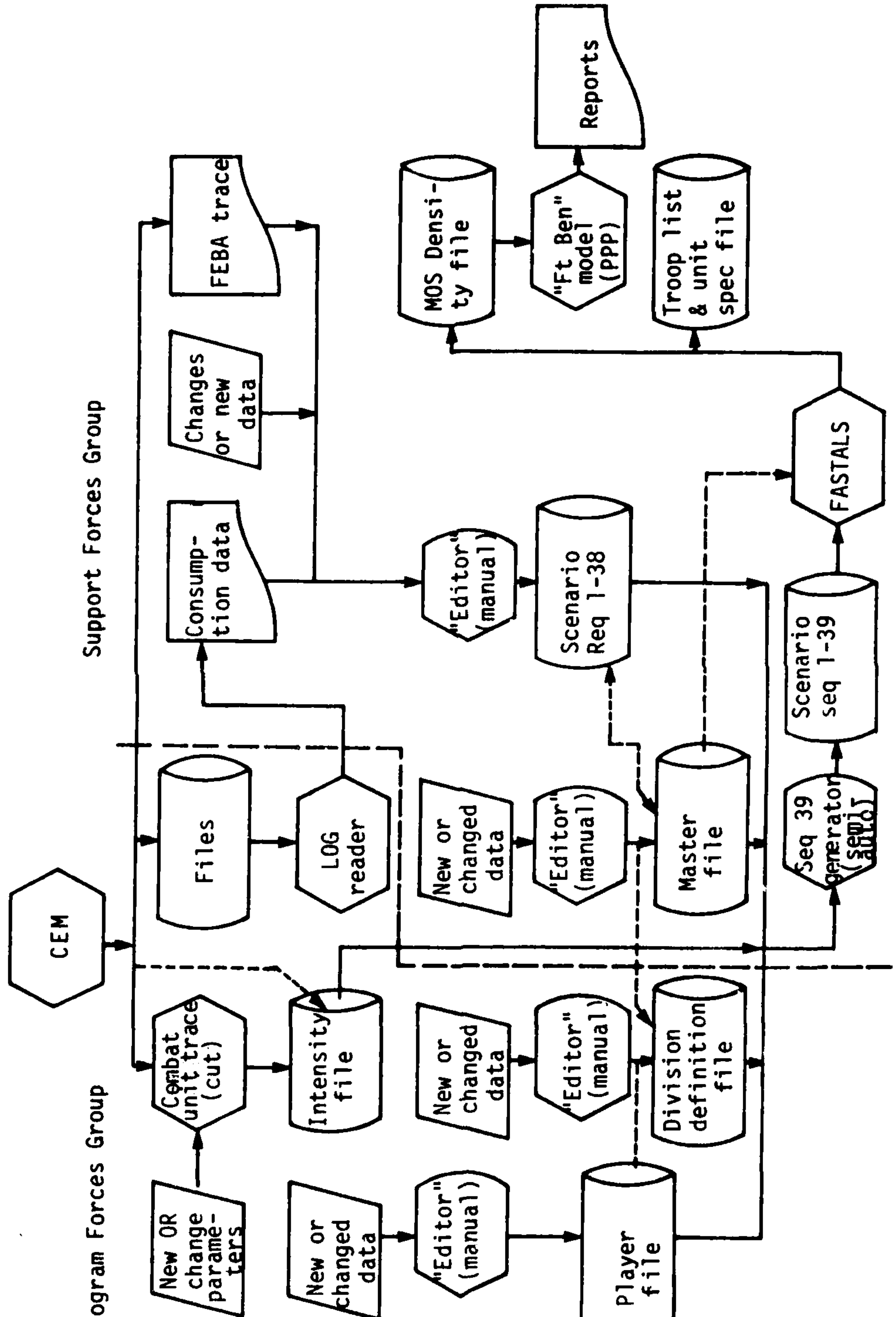


Figure C-3. Patient Flow Interface - TAA

Table C-1. CEM Input Categories
(page 1 of 2 pages)

- Defensive position
  - smoothed FEBA movement rate
  - thresholds--prepared defense
- Flank protection
  - force application factor

ENGAGEMENT RESULTS

- Firepower modifiers
  - artillery coordination factors
  - terrain factors
  - posture factors
  - barrier effectiveness indexes
  - supply rationing factors
  - supply constraints--personnel
  - supply constraints--major weapons
  - personnel constraints--arty bns
  - helicopter acceptable loss rate
  - artillery neutralization
- Counterbattery fire
  - personnel losses
  - cannon losses
- Personnel casualties
  - combat, active KIA, WIA, CMIA
  - combat, static
  - combat, reserve
  - DNBI
  - major weapon crews
- Weapon losses
  - tanks, APCs, active--hits
  - tanks, APCs, active--kills
  - helicopters, active losses
  - helicopters, retrievable (repair)
  - antitank/mortar weapon losses
  - tanks, APCs, static & reserve--hits
  - tanks, APCs--abandoned
- Supplies consumed
  - POL
    - major weapons
    - maneuver units
  - Ammo
    - major weapons
    - maneuver units
    - artillery weapons
  - Other supplies
    - major weapons
    - maneuver units
- Casualty treatment
  - personnel hospitalized
  - personnel returned to duty
  - average time in hospital
- Transportation delays
  - major weapon replacement (port or shop to pool)
  - personnel replacement (port or hospital to pool)
  - POL, ammo, other resupply (port to pool)
  - reserve commitment (army, corps)
- Missions
  - army--mission & reserve use
  - corps--mission & reserve use
  - division--allowable by state
  - brigade reserve rotation
  - estimation thresholds
- Fire support
  - GS reinforce DS
  - reserve division artillery use (Red)
- Sector assignment
  - boundary adjustment--corps
  - boundary adjustment--division
  - minimum division frontages

Table C-1. CEM Input Categories
(page 2 of 2 pages)

Red division replacement
    withdrawal state thresholds
    return state threshold
    minimum rebuild time
    replacement policy
	Force organization
	  Army--location, composition, status
	  Corps--location, composition, status
	  Division--location, composition, status
	  Brigade--location, composition, status
	  Reinforcing divisions
	  Reinforcing artillery battalions
	  Resupply and replacements

<u>SCENARIO</u>
 	
Map
  FEBA change
 	
Ground forces
  Artillery (by tube type)
    personnel
    breakdown rate
    increased expenditure factor
    firepower values
 	
Weapons
  tanks, APCs, helicopters
    crew personnel
    breakdown rates
    percent BD repairable
    firepower values
  Antitank, mortars
    firepower values
 	
Maneuver battalions
    personnel
    firepower (personnel only)
    POL, ammo, other on-hand supply
    major weapons in bn
	<u>DECISIONS</u>
	  Force estimates
	
	Maintenance capabilities
	  Tanks, APCs, helicopters
	    equipment repair time
	    max number in repair

C-4. TYPE KEY ASSUMPTIONS

a. The key assumptions applied to the TAA are essentially those provided by approved scenarios and those stated directly by the tasking directive. Types of assumptions are displayed in Figure C-4.

b. Other type assumptions take the form of historical example or input agency approved foundation. One example may be the statiscal assumption that 20 percent of all WIAs return to duty within 4 days based on World War II, Vietnam, or current approved data. Mean time between failure (MTBF) type data for new equipment may be derived from experience type data or test bed results. Assumptions of this type are not always conspicuous, but inbedded in the data sources.

c. Key assumptions included in scenarios and tasking directives are clearly stated in the text of the final TAA report document.

C-5. SENSITIVE PARAMETERS

a. Sensitive parameters are highlighted as those processes or elements of data that have a significantly marked effect on the results achieved by the analysis. The input number of tank crewmen may not materially affect the results of combat. A tank probability of kill at 2,000 meters of .9 or .7 may have a significant effect on the results of combat. The most sensitive parameters of the analysis, based on actual sensitivity testing or the judgment and experience of analysts, are those indicated in Figure C-5.

b. The parameters noted in Figure C-5 are highlighted as being those areas, more than others, where variance or error may tend to lead to dispartiy of results.

C-6. OUTPUTS

a. Major TAA report outputs are listed at Table C-2. These outputs are the objective of the study and are clearly stated and discussed in the main body of the study report.

b. A line-by-line flow of input data processed through the study to output is beyond the scope of this study and is not provided in detail. Pure data input changes are formed through computer simulation. Input weapons effectiveness and basic ammunition loads, through model programing, may contribute to output data in the form of FEBA movement, for example. Study input and output has been viewed in this analysis in terms only of their character, source, and the validity of the methodology applied.

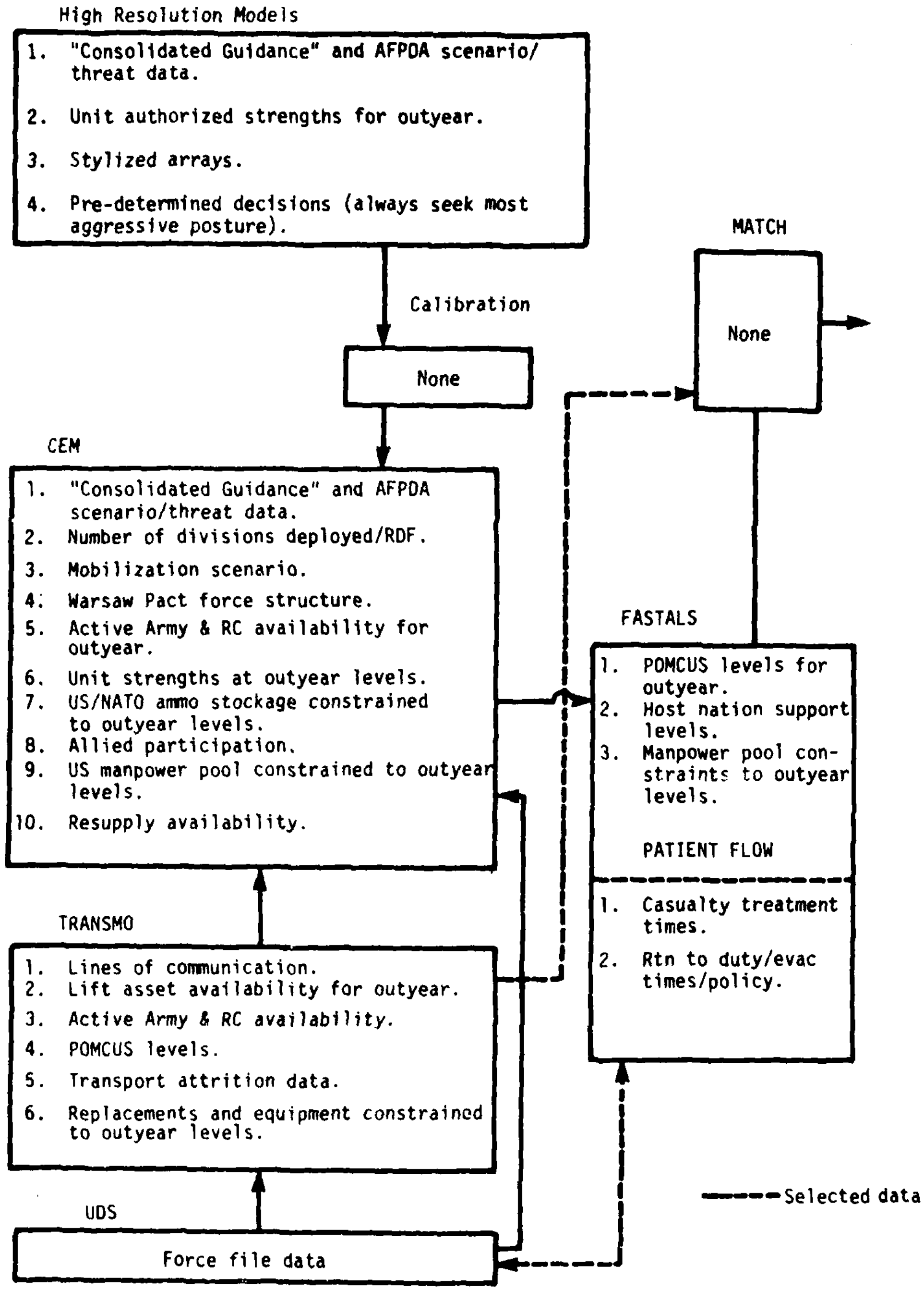


Figure C-4. Type Assumptions - TAA

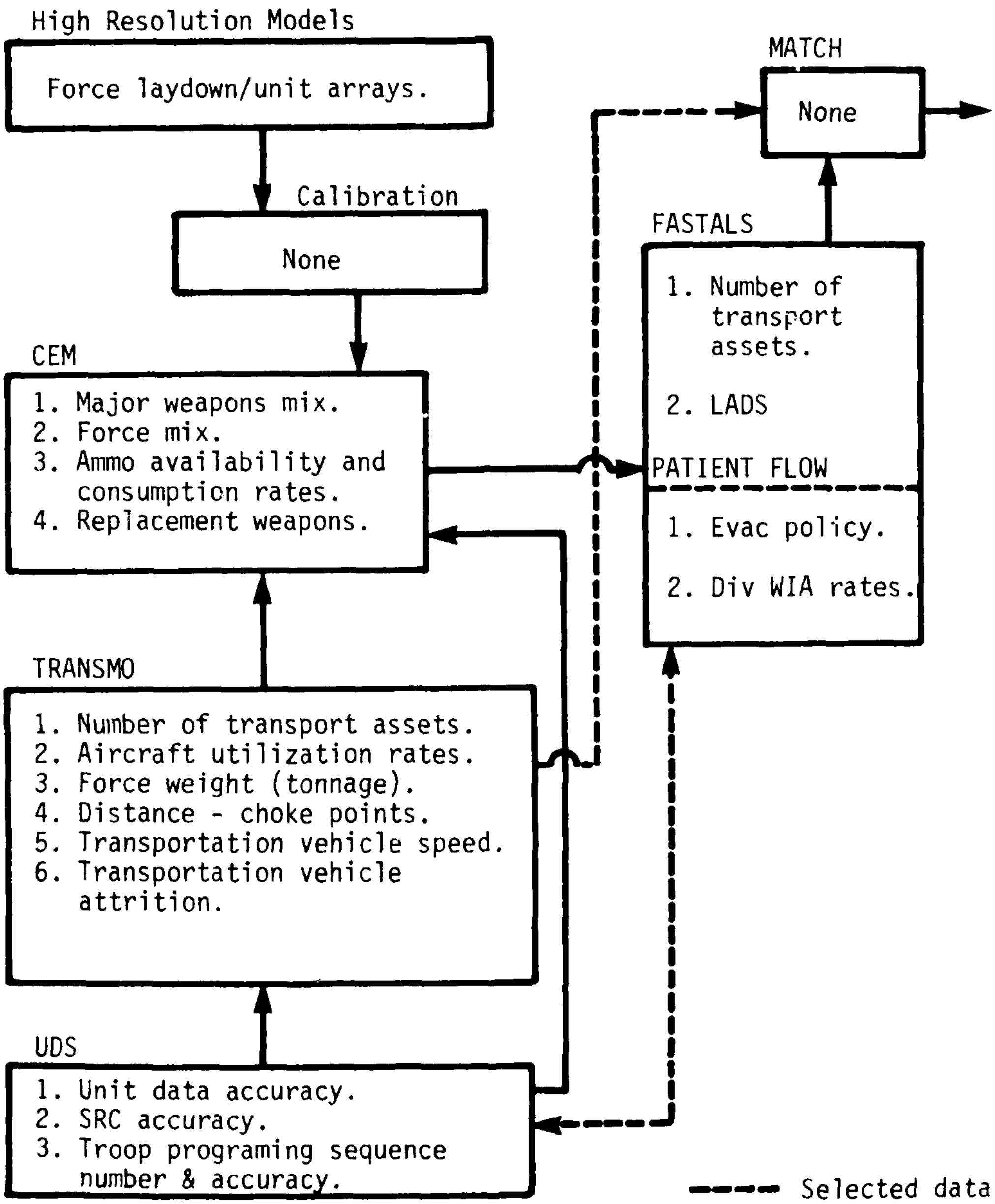


Figure C-5. Sensitive Parameters - TAA

AD-A102 213 ARMY CONCEPTS ANALYSIS AGENCY BETHESDA MD F/G 5/1
TOTAL ARMY REQUIREMENTS PROGRAM - PHASE I (TARP-I).(U)
JUL 81 N W FLEMING, W J MAYHEW, G R FISCHER
UNCLASSIFIED CAA-SR-81-14 NL

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Table C-2. TAA Output Categories
(page 1 of 3 pages)

Tonnage requirements vs deliveries for Europe based on enhanced lift capability
Tonnage requirements vs deliveries for Europe based on programed lift
FEBA traces for simulation with programed NATO ammunition levels
FEBA traces for simulation with enhanced NATO ammunition level
FEBA at ID+90 and ID+180
Situation on D-day
Cumulative FEBA loss (average)
Relative intensity of combat
US MNBN ammunition levels
Daily MNBN ammunition expenditure
MNBN ammunition (authorized and on hand)
Total NATO artillery ammunition (authorized and on hand)
Daily NATO artillery ammunition expenditure
US artillery ammunition (authorized/on hand)
Non-US NATO artillery ammunition (authorized/on hand)
Total NATO permanent combat personnel losses (cumulative)
US permanent combat personnel losses (cumulative)
US combat personnel strength
Daily US combat personnel losses (temporary)
Total NATO tanks
US tanks
Total NATO APC
Total NATO helicopters (authorized/on hand)
Case 1, US force structure requirements
Replacement personnel requirements vs assets (cumulative)
Distribution of available replacements
Conventional ammunition company (SRC 09038H2) requirements, corps area (cumulative)
Conventional ammunition company (SRC 09038H2) requirements--European theater (cumulative)
POL structure comparison--TAA 84/85
Nondivisional US supply structure requirement comparison (Case 1), TAA-84/85
Nondivisional US supply structure requirement comparison (Persian Gulf), TAA-84/85

Table C-2. TAA Output Categories
(page 2 of 3 pages)

Nondivisional unit level maintenance (DS/GS) requirements comparison (cumulative)
US nondivisional maintenance requirements
Intratheater resupply movement by mode and category of supply
Daily movements by mode
Daily movement requirements by category of supply
Communications zone bed requirements
Evacuation policy impact on CONUS bed requirements
Engineer force structure requirements comparison, (excludes labor service)
US engineer force structure requirements comparison
Military police force structure requirements (cumulative)
Logistics services support force structure requirements comparison
Logistics services support force shortfall
US combat forces, Central Europe
US nondivisional artillery battalions
USAREUR combat units
POMCUS units
Unit deployment priority list
Personnel/minor weapons--US maneuver battalions
Major weapons--US maneuver battalions
Non-US NATO divisions
Non-US NATO division brigade configuration
Non-US NATO weapon systems
Non-US NATO divisional (DS) artillery
Non-US NATO nondivisional (GS) artillery battalions
US combat weapon systems
US ammunition (thousands of short tons)
US personnel replacements
Non-US NATO weapon authorized levels
Arrival schedule of Warsaw Pact divisions
WP weapon systems
Warsaw Pact weapon system configurations
Warsaw Pact asset postures
European theater programed lift assets
Priority movement sequence of major active and reserve combat forces and theater arrival dates, Europe
European theater movement requirements
Army force closure (program lift)
Requirement for added lift to Europe

Table C-2. TAA Output Categories
(page 3 of 3 pages)

- NATO and US logistic input summary
- Total NATO and US asset status at end of warfighting simulation
- Percentage of authorized artillery ammunition on hand, D+180
- Host nation support--US unit equivalent direct structure offset (cumulative structure spaces, thousands)
- German labor service unit equivalents
- Host nation support offset for US force structure (structure spaces in thousands)
- Available personnel replacements
- Average replacements processed per day (Case 1--AFCENT) (thousands)
- Cumulative US nondivisional maintenance structure requirements (thousands)
- Intratheater movement requirements (STON, thousands)
- Tonnages entering theater (STON, thousands)
- Transportation structure requirements (thousands)
- Movements control organizations
- Daily tonnages entering theater (000)
- Transportation mode tonnage distribution
- Hospital admissions (thousands)
- Returns to duty (thousands)
- Cumulative medical force structure requirements (thousands)
- Cumulative requirements for US engineer structure spaces (excluding labor service) (thousands)
- US troop effort, engineer battalion (combat heavy) (COMMZ)
- PW and civilian internee workload (cumulative)
- Cumulative requirements for C-E structure spaces (thousands)
- Cumulative requirements for C-E structure with no host nation support (thousands)

NOTE: Numerous individual data elements are inherent in each of the above output categories.

ANNEX I TO APPENDIX C

DATA REQUEST EXTRACT

Data input	Provided by	Description/remarks
Data requirements to initiate force file construction for Central Europe and each contingency		
Force/units (T-tape)	DAMO-FD	TAA. US force tape which provides US force data necessary for TAA/P simulation. Printout and data listed below are extracts from the T-tape and in addition to the tape. Data required for Central Europe and each contingency area.
Standard requirement code print out	DAMO-FD	TAA only. Sequential listing by SRC of force in following order: SRC, COMPO, DAMPL, TPSN, CARSS, UNTDS, UICCC, EDATE, LOC, ADCON, NTREF, STAGR. Purpose: early development of force and quality control.
Unit identification code list (PAAL)	DAMO-FD	TAA only. Alphabetical listing of units by unit identification code in the following order: UICCC, SRC, EDATE, TPSN, COMPO, BRANCH, UNTDS, Activation Code, Type Code, Location ADCON, Display Compute Column, DSCMP, NTREF, STAGR. Purpose: enables team to conduct quality control actions with several force tape breakouts.
Weapons systems breakout matrix	DAMO-FD	TAA/P. A breakout of total number of weapons systems by type of system, inventory total, production quantity, geographical/MACOM location, and contingency allocation.
Unique consideration listing	DAMO-FD	TAA/P. List of unique situations applicable to force that may be hidden in T-tape. Examples are: Field Artillery Battalion 3x6 or 3x8, Tank Battalions - 58 tanks rather than 54, units organized with "S" series TOEs but equipped in accordance with another series TOE, etc.
TRANSMO model for Central Europe and each contingency		
Scenario	DAMO-SS DAMO-FD/RQ	TAA/P. Request complete scenario for Central Europe and each contingency area to be played (whether simultaneous or sequential). This data should include geographical areas, sequence of events, assumptions, deployments, relationship between isolated scenarios, threat and allied civil and military forces, and any unique operational factors that will bear on the studies.
Airlift availability	DALO-TSM	TAA only. Airlift availability expressed in terms of the number of aircraft by type available by time. Types include: US Air Force, US civilian air fleet, and non-US civilian air fleet.
Aircraft capability	DALO-TSM	TAA only. Aircraft capability expressed in both terms of the number of combat ready troops and the amount of short tons that can be carried in one lift by type cargo aircraft types cited above.
Aircraft utilization rates	DALO-TSM	TAA only. Data expressed in terms of the average number of hours type aircraft cited above are available to fly during a 24-hour period.
Sealift availability	DALO-TSM	TAA only. Sealift capability expressed in terms of the number of sea bottoms by type, available by time. Indicate source of craft, US Navy, other US military craft. Civilian shipping and non-US. Shipping: indicate military and nonmilitary, i.e., civilian (exclude Warsaw Pact). Data provided by type bottom breakbulk container, RO RO, sea barge, LASH, etc.
Vessel capability	DALO-TSM	TAA only. Vessel capability expressed in terms of the average programed cargo capability by type bottom.

Data input	Provided by	Description/remarks
Sea convoy factors	DALO-TSM	TAA only. Data includes convoy sizes/escort requirements.
Sea attrition	DALO-TSM	TAA only. General convoy operating factors are obtained from Seawar 85. Attrition rates are the anticipated percentage of bottoms lost per convoy/independent sailing expressed as a function of time.
Air attrition	DALO-TSM	TAA only. Attrition rates are the anticipated percentage of sorties lost expressed as a function of time.
Movement requirement Other services, USAF, US Navy, USMC	DALO-TSM	TAA only. This data is the statement of lift requirements for USAF, USN, and USMC expressed in number of passengers and short tons by type of cargo (bulk, oversize, outside) by available and in-theater required data.
Army combat LAD	DAMO-SS	TAA only. This data is the US deployment schedule.
CEM and COSAGE models for Central Europe and each contingency		
US force ammunition supplies	DAMO-RQ	TAA and P. Require short tons of artillery and maneuver unit ammunition in theater PWRS and available for resupply for 180 days in 4-day increments. Request artillery ammo also be broken down by caliber in STONS and fuze identification.
Vulnerabilities US equipment	USAMSAA	Required to calibrate CEM. Request that vulnerabilities data be expressed in K-kill values computed by killing system.
Personnel replacement availability	DAPE-MBP	TAA and P. Personnel availability replacement for Central Europe in 4-day increments for 180 days.
D-day disposition and arrival deployment schedule (to include LADs)	DAMO-FD	TAA only. List by unit designation of forward deployed US units (divisional, nondivisional) and logical region assignment. TAA only. List by unit designation of reinforcing formations (divisional and nondivisional) and assignment. Request LADs by annotated on this listing.
Theater evacuation policy for personnel and equipment	DAMO-FD	TAA only. State the theater evacuation policy for 180-day conflict broken down into explanations of policy for personnel and for equipment. If policy for equipment is not uniform, request exceptions be annotated, by major item.
War reserves non-US NATO threat	ITAC ITAC/ACSI-Red Team	P and TAA. Identify war reserve availability sequence and production schedules for non-US NATO allied forces in designated contingency areas and the threat force.
and US war reserves	DAMO-RQ	Same data required for US force.
US, non-US NATO, and each contingency area allied force maintenance capability data	ITAC/DAMO-RQ	TAA only. Ability to repair tanks, APCs, and helicopters in terms of "maintenance bay" capabilities increasing over time for force arrival or force activation.
Non-US NATO and each contingency area allied force unit data	ITAC	TAA only. Request that non-US NATO and contingency area allied forces be broken out. This breakout assists CAA in assignment of firepower scores and ensures quality control of our product.
Vulnerabilities NATO (non-US) equipment and equipment for each contingency area allied force	USAMSAA	Required to calibrate CEM. Request that vulnerabilities data be expressed in K-kill values computed by killing system.

Data input	Provided by	Description/remarks
NATO data (non-US)		
Logistics/personnel	ITAC	TAA only. ?equired are PWRS by type system, production by type system, additional assets by type system for stripped units, and personnel replacement fl #.
Threat data		
Units--arrayed against Central Europe and in each contingency area	ITAC with concurrence from DAMI-Red Team	TAA only. Request that the threat data be provided in accordance with the formats provided. In addition, the following information is required: on-board basic load and fuel storage (including auxillary tanks), capability per combat, and combat support vehicle/aircraft (helicopters).
Force/arrival sequence for forces arrayed against Central Europe and each contingency area	ACSI-Red team	TAA only. Request the arrival sequence, initial assignment location, and guidance on threat decimation pool policies/utilization for the threat forces to be employed in Central Europe and each of the contingency areas.
Threat		
Vulnerability threat equipment	USAMSAA	TAA and P. Required to calibrate CEM. Request that vulnerability data be expressed in K-kill values computed by killing system.
Logistics/personnel	ITAC/DAMI-Red Team	TAA only. Required are PWRS by type system, production by type system, additional assets by type system for stripped units, and personnel replacement flow.
Ammunition supplies/ consumption target	DAMO-RQ	TAA and P. Threat ammunition supplies need to be expressed in the following manner. Ammunition in short tons broken down as follows: for artillery units by type, and manuever units; broken down by in theater and production system for 180 days by 4-day increments.
Non-US NATO and each contingency area allied force air data	ITAC	TAA only. Request data for this file in two areas, air power and air defense.
US air data	DAMO-RQ with approval AF/XOEX	The Air Power File: requires data expressed as follows: type of aircraft available over time (180 days); sortie capability of air frames by type in consideration of turnaround times; munitions available to support air-to-air battle reduced from munitions available for offensive air support, i.e., battlefield interdiction and close air support.
Non-US NATO and each contingency area allied force air defense data	ITAC	The air defense portion should be expressed in terms of fire units div and nondiv available, launcher availability data and munitions availability data for 180-day conflict for high altitude and low altitude systems.
US air defense data	DAMO-RQ	
Force roundout for NATO Central Region force		
Logistics planning factors and asset list	US Army Logistics Center	TAA only. Request that the US Army Logistics Center provide CAA POC consumption planning factors by class of supply expressed in terms of pounds of materiel per man (in theater combat force) per day for combat intensities. The combat intensities are: intense, moderate, light, and reserve.
Force planning information system data	USAMSSA	TAA only. Request that force planning information system data (based on SRCs provided) be provided CAA POC as follows: strength, weight, and maintenance criteria data for each SRC Maintenance criteria data is defined as maintenance requirement expressed in manhours per day.

Data input	Provided by	Description/remarks
Host nation support	DAMO-FD DAMO-ZN	Request policy statement on host nation support availability for TAA.
Decision: will restructured general support be played	DAMO-FD DALO-PL	TAA only. Decision required early. The same data required above applies. However, the masterfile development will require a complete rework of existing data in order to request inputs from US Army Logistics Center and USAMSSA. A delayed decision will delay the FASTALS analysis, associated force roundout, and ability to meet completion date for the Design Case.
Force roundout for non-Central Europe contingencies force		
Logistics planning factors and asset list	US Army Logistics Center	TAA only. The same type data input information request for the NATO Central Region force above will be required for the non-Central Europe contingency force.
Force planning information system data	USAMSSA LEA	The same type data input information requested for the NATO-Central Region force above will be required for the non-Central Europe contingency force.
Host nation support	DAMO-FD DAMO-ZN	Request policy statement on host nation support availability for TAA non-Central Europe contingency area.
Other data requested		
Support policy for non-Army US armed forces US Navy US Marine Corps US Air Force	DAMO-FD	Request that the Army support requirements for other US armed forces in both the NATO Central European Theater and the non-Central European areas be provided. Request that data include consumption rates for all classes of supply to be provided. Port handling requirements and if possible SRC equivalents (if applicable) for forces to be supported. Timing of support is also critical. Request that timing be expressed in terms of when support is to commence and duration of support. This should be broken out by service to be supported and the magnitude of support to be provided each service (i.e., the number of SRC equivalent units to be supported).
FASTALS masterfile update	DAMO-FD	Request an annotated TAA Masterfile printout reflecting ARSTAF and MACOM masterfile update.
USAF consumption factors	DALO-PLF	Lbs/man/day by class of supply.
PWRMS	DALO-SMW DALO-TSE	In European theater includes theater reserves (TR) 1, 4, 5, and operational project stocks.
Supply data	LOGCEN (ATCL-O) DALO-SMS	Consumption rates (lbs/man/day); ammo throughput policy (relates to the distribution of Class V supplies by logical region to be used for allocation purposes); theater stockage objective days of supply, timing of stockage buildup.
Maintenance doctrine/data	DALO-SMM	Overall doctrine; annual maintenance manhours available per repairers/aircraft flying hours; aircraft maintenance down time.
Transportation data	DALO-TSP	Support and materiel distribution policies by mode and logical region destinations; movement rates.
Engineer support and construction data	DAEN-ZCM (Eng-Studies Center)	Enemy inflicted damage rates and construction damage repair support data; existing construction assets; theater construction policy; special engineer efforts (operational projects, support to other services, etc.)
US personnel filler and replacement data	DAPE-MBM	Projected availability of assets from training base, individual ready reserve and standby reserve.
Hospitalization and evacuation data	DASG DCSOPS	Hospital wounded in action (WIA) admission rates, disease and nonbattle injury (DNBI); evacuation policy.

Data input	Provided by	Description/remarks
Unit nonmobilization weights	TRADOC (Transportation and Engineering Agency)	The weight of a unit (by SRC) that cannot be transported by organic vehicles.
AMMO/WARF Study peculiar data requirements, COSAGE/CEM		
US TOE (DIV-86)	DAMO-FD	TOE data for P arraying. COSAGE input developed from data.
Non-US NATO force structure	ITAC	Force structure data used in P arraying.
Threat force structure of a stylized combined arms army	ITAC	Force structure data used in P arraying.
Type ammunition and fuzes to be employed in NATO theater	DAMO-RQ	Identify the type of munitions and fuzes to be employed by the US force structure for 1987 in the NATO theater.
Threat land forces and most likely scenario for 1987	ITAC	Provide postulated threat scenario in terms of avenues of approach, threat forces and tactics for threat attack in NATO Central Region.
Intra/intertheater shipping loss factors--air and sea	DAMO-RQ	Identify intra-/intertheater shipping loss factors to be applied to P Ammunition Study.
Threat force structure and area arrays for threat rear area	ITAC	Identify the threat logistic system array and logistics system arrays to be found in threat front-rear area.
LIN code list for US and non-US NATO forces	DAMO-RQ	Provide LIN code list for US (and non-US NATO forces, if wartime replacement factors are required by P tasker).
Lethal artillery area data for WARFRAM	LEA	Provide lethal artillery area data for war. Threat force artillery against US materiel targets.
US logistics throttle	LEA	Provide data on heavy materiel maintenance company availability and capability to handle logistics input to theater.
Logistics Evaluation Agency tape (MIE density/quantity profiles)	LEA	Provide data on amount of US equipment by major item of equipment to be introduced into the theater. That data should be expressed both in quantity and percentage to be inputted per combat zones for seven time periods during a 180-day conflict.

APPENDIX D

WARTIME REQUIREMENTS FOR AMMUNITION AND MATERIEL (AMMO/WARF) AND WARTIME REQUIREMENTS FOR AMMUNITION, MATERIEL, AND PERSONNEL (WARRAMP)

D-1. OVERVIEW

a. The objective of the US Army Concepts Analysis Agency (CAA) Wartime Requirements for Ammunition and Materiel (AMMO/WARF) study methodology is to develop US ammunition consumption rates and wartime replacement factors (WARF) for equipment for a conflict occurring during an objective outyear. The AMMO/WARF methodology is presently being replaced by a Wartime Requirements for Ammunition, Materiel, and Personnel (WARRAMP) study methodology, which includes a Wartime Fuel Factors (WAFF) methodology.

b. The AMMO/WARF methodology was not a single computer simulation or computational methodology, but rather a series of computer models and computations. The WARRAMP methodology is a streamlined and enhanced methodology based on that of AMMO/WARF.

c. Succeeding sections of this appendix portray AMMO/WARF and WARRAMP in greater detail:

(1) Sections I and II:

(a) The overall study methodologies and key computational steps.

(b) The types of major data input and their sources.

(c) The type key assumptions made.

(d) The sensitive parameters of the methodologies.

(e) The study outputs.

(2) Section III. Comparisons of the two methodologies.

Section I. AMMO/WARF

D-2. METHODOLOGY AND KEY COMPUTATIONAL STEPS

a. The overall AMMO/WARF study methodology is depicted in block outline in Figure D-1. Figure D-2 depicts the AMMO/WARF methodological process in narrative format.

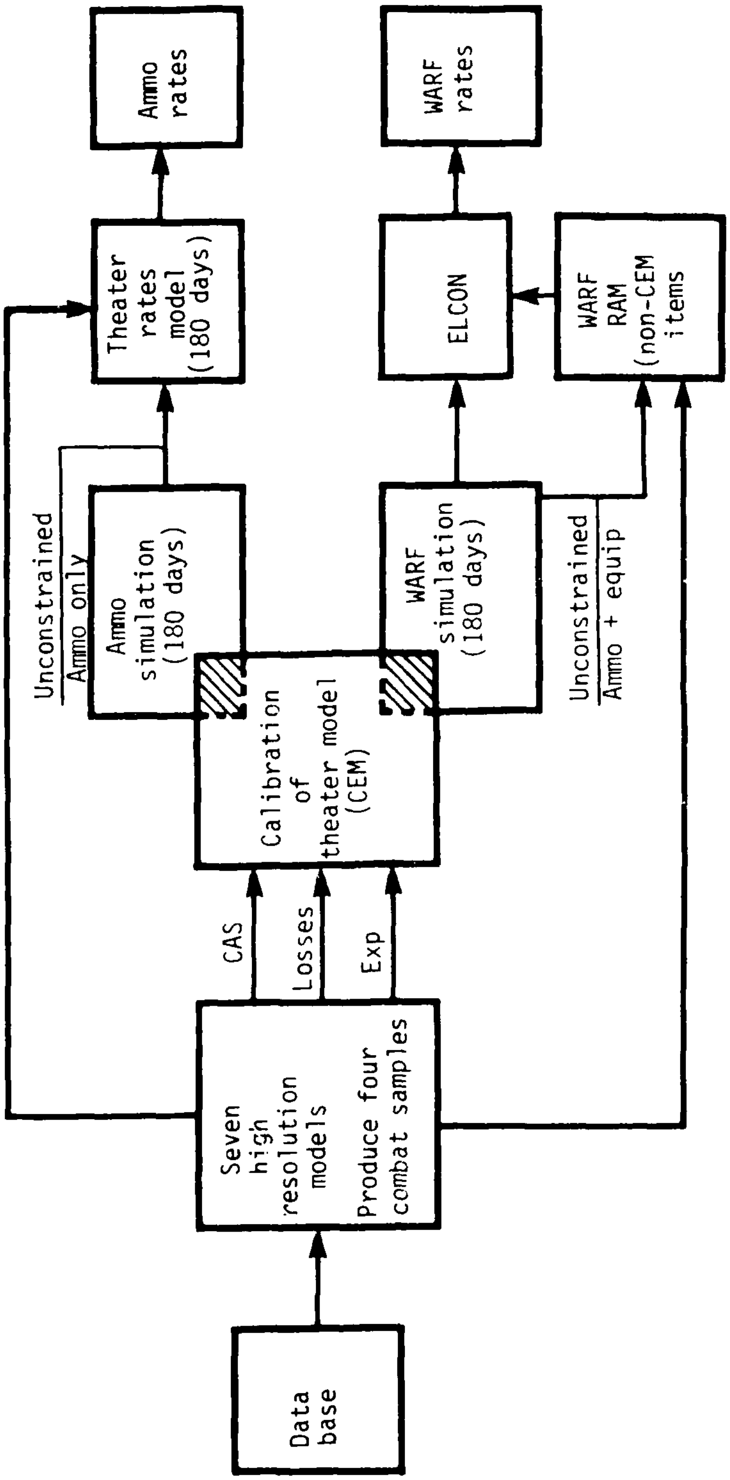


Figure D-1. Methodology Flowchart - AMMO/WARF

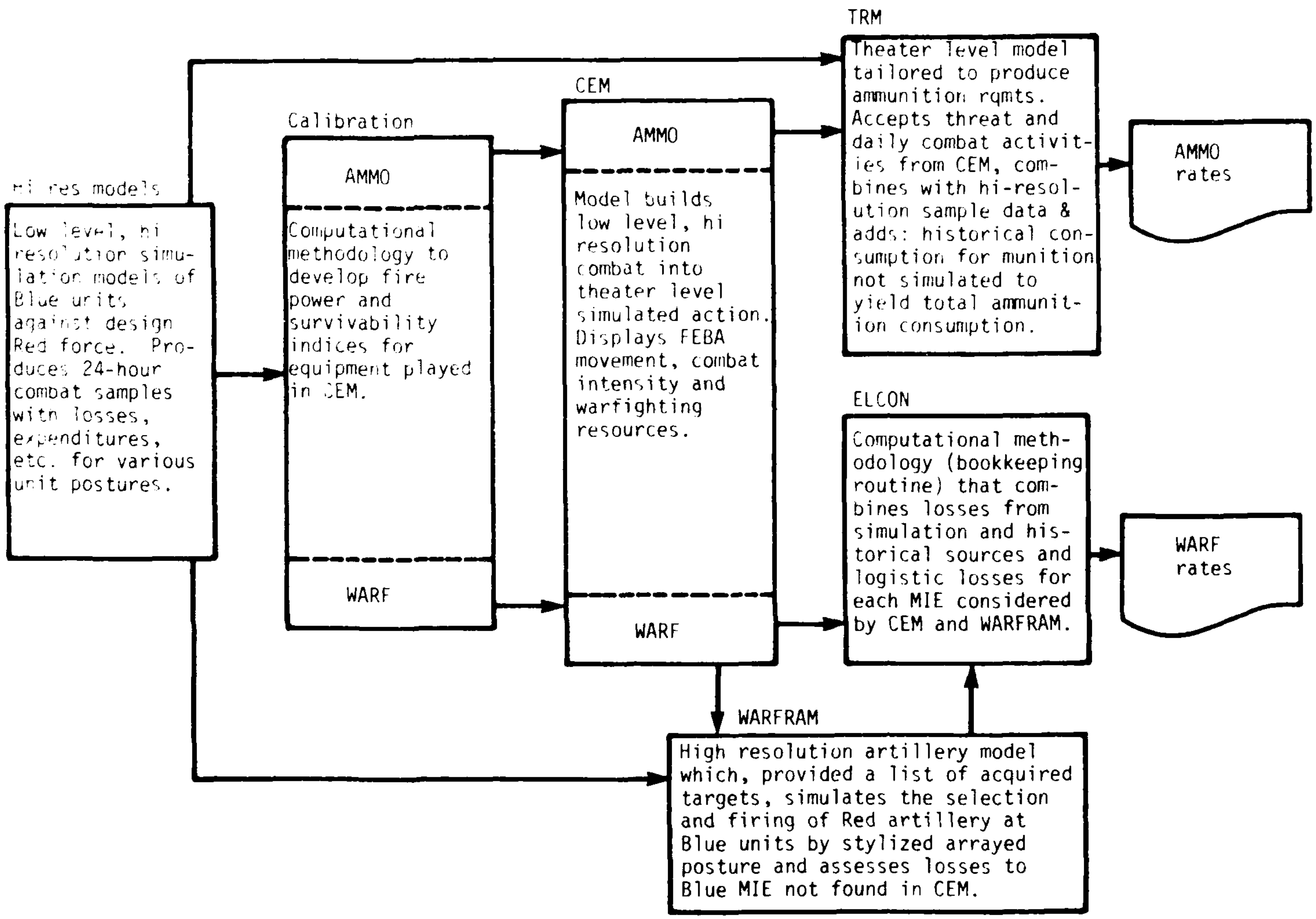


Figure D-2. Narrative Methodology - AMMO/WARF

b. Combat Samples. At the start of the information flow are the combat samples. A combat sample is a day of combat between a large WP force and a large US force. It includes tank/antitank and infantry battles between small units, as well as artillery (including corps artillery) and helicopters firing at acquired targets. Four samples are developed with the aid of high resolution models. Each sample pertains to a combat posture of the US force. The results of the combat sample are measured in terms of the ammunition fired/expenditures (exp) by each antipersonnel weapon system, personnel casualties (cas) inflicted by each type weapon system, and the armor losses achieved by each antiarmor weapon system. These data are developed for both US and WP weapons.

(1) Close Combat Models. Close combat is simulated with the aid of three models--one for dismounted infantry, one for tank/antitank weapons, and one for antiarmor attack helicopters. When a battle has been defined between small units (battalion level or smaller conflict), the Helicopter Model (HOVARM) is first used to determine the targets destroyed by helicopters which must be removed before the battle is simulated with the Tank/Antitank Model (TATM). The purpose of TATM is to determine the ammunition expended in the battle by each armor and antiarmor weapon system and the armor vehicles and the antiarmor weapons systems destroyed. At the conclusion of the armor battle, there may or may not be a follow-on infantry battle. If so, infantry weapon systems are simulated with the Infantry Combat Model (ICM). The purpose of ICM is to determine casualties inflicted by each small arms weapons system and the number of rounds fired by each system. Both TATM and ICM simulate the interaction of weapon systems, including indirect fire weapons.

(2) Artillery Models. Artillery is simulated with aid of four models. The first of these is the Target Acquisition Model (TAM). The purpose of TAM is to simulate the sensors and acquire arrayed targets to generate fire missions for both the Blue Artillery Model (BAM) and the Red Artillery Model (RAM). The purpose of these models is to assign the arrayed artillery batteries to the arrayed targets. Although the names of BAM and RAM indicate their usual force relationships, either model could be used for either of the opposing forces. BAM and RAM differ, essentially, in that the weapon-munition combination can defeat a target (by inflicting a set level of damage), then the minimum weight of ammunition required to defeat the target determines the weapon munition selection. RAM, on the other hand, is hard-wired to allocate weapon-munition combinations based upon a predetermined input table. A fourth model is the Casualty Assessment Model (CAM). The purpose of the CAM is to estimate the percentage of personnel casualties and armor losses inflicted on the targets as a function of the rounds fired.

c. Theater Models

(1) Concepts Evaluation Model (CEM). The high resolution models generate the Blue and Red personnel casualties, armor vehicle losses, and helicopter losses for each of the four combat samples. This information is used to calibrate the CEM. Once calibrated, the CEM simulates a theater conflict in detail. The CEM is operated in three modes.

(a) The first mode is that in which ammunition is unconstrained for US forces but equipment for US forces is constrained to those quantities programed for the target year of the study. Ammunition and equipment for both NATO allies and the Red forces are as programed for the target year. This mode produces the profile of combat activity (also called the scenario) and the share of the Red threat faced by US forces. The threat and scenario become input information to the Theater Rates Model (TRM) which, in turn, is used to determine ammunition requirements.

(b) The second mode of CEM operation is that used to calculate wartime replacement factors (WARF). When in the WARF mode, both ammunition and major items of equipment are considered to be in unlimited supply for US forces. Again, ammunition and equipment for both the NATO allies and the Red forces are constrained to that projected for the target year of the study (see "WARF Mode" following).

(c) The third mode of CEM operation is identical to mode one, except that the supply of ammunition available to the NATO allies is unlimited.

(2) Theater Rates Model (TRM). The TRM also simulates a theater conflict over a specified period of time, but this model is tailored to produce only ammunition requirements and only for US forces. The model accepts the share of the Red threat and the scenario of daily combat activity from the CEM and combines this information with the basic information produced for each combat sample by the high resolution models. Casualty and armor loss data are used to attrite both Blue and Red as the model steps through each day of the simulated conflict. At the end of the specified time period, the ammunition expenditures from the sample are used to calculate the ammunition rates for each weapon/munition combination included in the simulated war.

d. AMMO Mode

(1) The AMMO mode is essentially completed in the TRM. The ammunition rate used is measured in terms of rounds/weapon/day and is defined as follows:

$$\text{Ammunition Rate} = \frac{\text{Simulated combat and other ammunition expenditures for a given time period}}{\text{Time period x avg TOE weapons strength}}$$

(2) It is important to recognize that ammunition rates are not based upon the consumption of weapons committed to the battle, but rather are based upon the total TOE deployed weapons. A committed ammunition rate would be based on the average number of weapons engaged in combat each day, while deployed rates (which are normally lower) are based on the average number of weapons deployed by the table of organization and equipment (TOE) to the theater. The rates for bulk allotment items are calculated on the basis of total TOE personnel deployed to the theater and are measured in terms of requirements/1,000 men/day.

e. WARF Mode

(1) The WARF mode methodology is distinctly different from the AMMO mode as depicted in Figure D-1. The WARF methodology develops equipment loss rates based on the interaction of three conditions: (1) the combat posture of the force, (2) the location of the equipment relative to the FEBA, and (3) the cause of loss. A matrix system called System for Estimating Materiel Wartime Attrition and Replacement Requirements (SYMWAR) describes the interaction of these three conditions and provides the basic WARF structure. This SYMWAR loss matrix is displayed in Figure D-3. Under the SYMWAR methodology, a separate matrix (by posture, cause, and theater zone), based on data from the Logistics Evaluation Agency was constructed for each item of equipment and completed with historically developed loss rates. Under WARF, historical data within the hachured area of the matrix in Figure D-3 are replaced with the results of war games and simulations. Such results reflect changes in weaponry, mobility, target acquisition capabilities, and tactics which have occurred since World War II and Korea. The losses assessed by the simulations are entered into the matrix of Figure D-4 for each major item of equipment (MIE). Historical data are entered in the unhachured portion of the matrix. Using the posture sequence determined for US forces in the CEM, attrition rates are computed by summing the losses over time. ODCSOPS provides intertheater logistic loss factors which are applied against equipment in unit transport and replacement items. Also provided are loss factors for intratheater movement of equipment. All losses are then applied in the Equipment Loss Consolidator (ELCON) program.

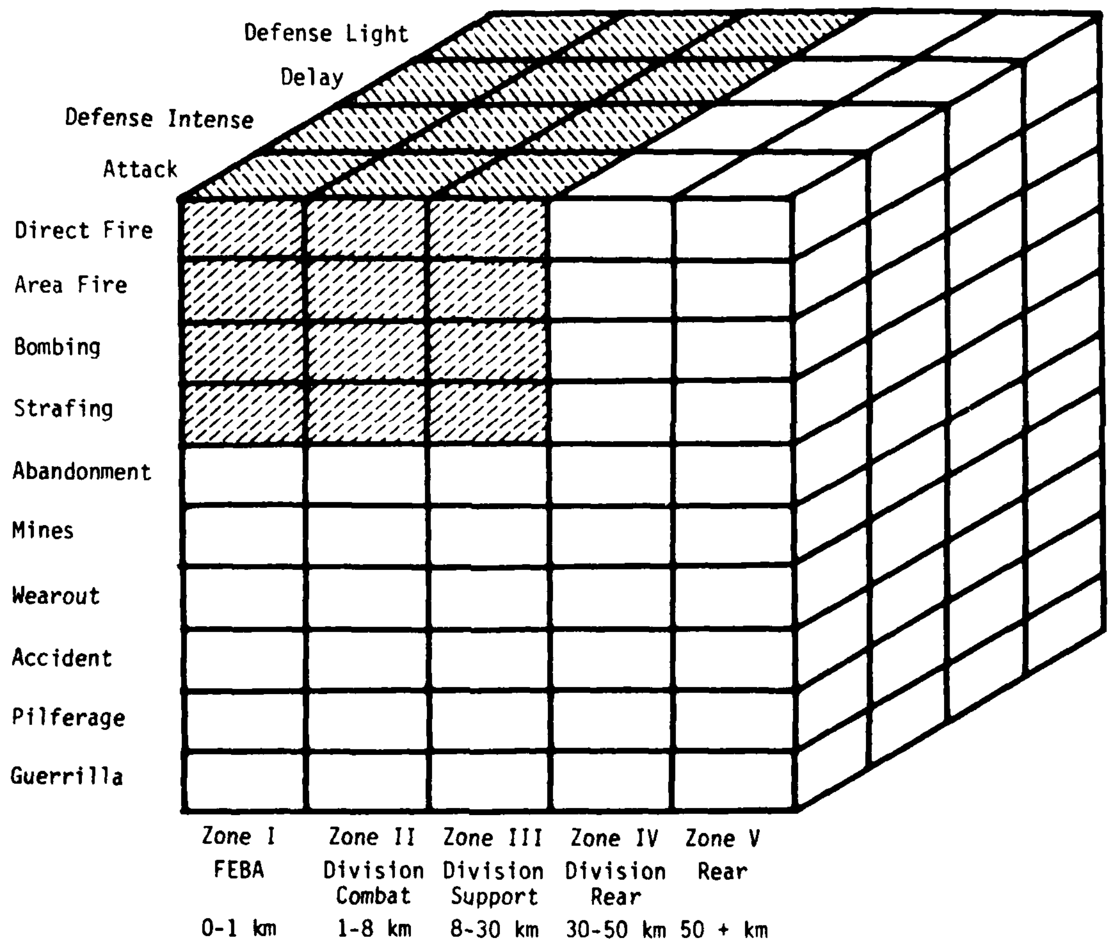


Figure D-3. SYMWAR Loss Matrix

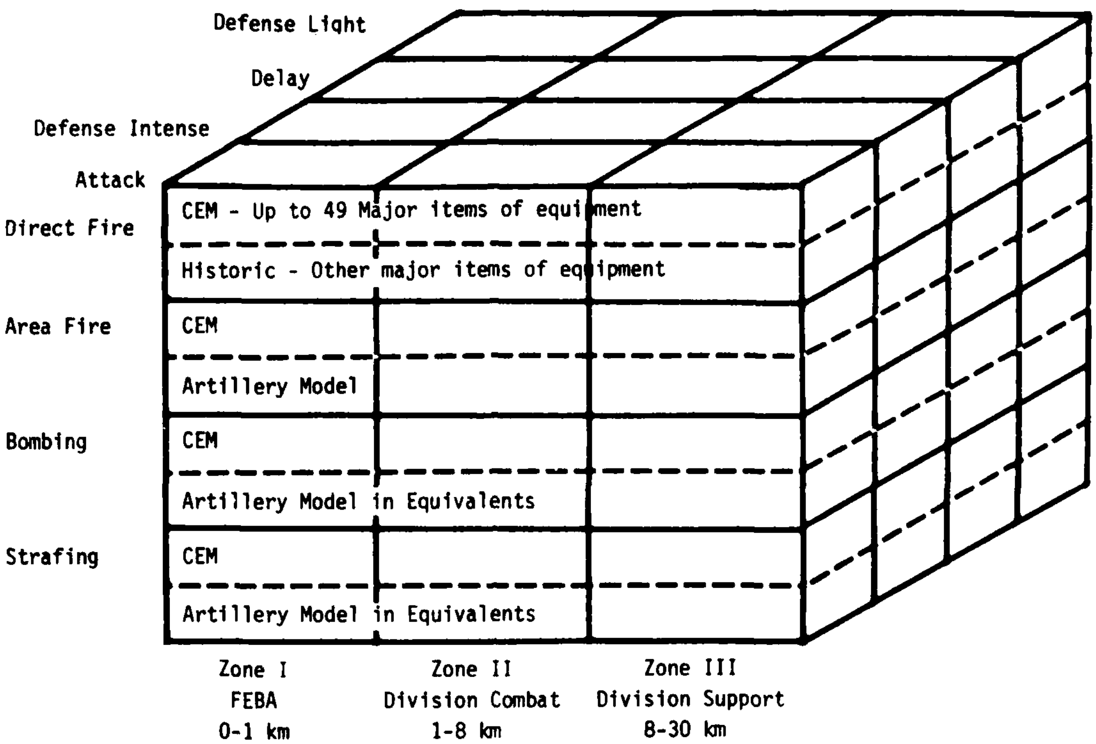


Figure D-4. Cells Replaced by Combat Simulation

(2) CEM. The CEM is the primary source for those items of equipment (primarily direct fire weapons systems) for which a significant portion of losses is expected to result from direct fire. The basis for loss assessment is the set of combat samples developed in the high resolution models. Detailed assessments are made with the forces in delay, defense intense, defense light, and attack postures. Each posture is assessed for a 24-hour period. Several major items of equipment which are affixed to a component of the primary direct fire weapon system are given the same CEM category as the host weapon system. These MIE are assumed to be nonrepairably lost at the same rate as the host system (i.e., the machinegun fixed on the M60A1 tank).

(3) The Artillery Models. A large number of costly items such as trucks, engineer equipment, and electronic equipment, not normally a part of direct fire engagements, may suffer significant losses from indirect fire. For these items, direct fire losses are taken from history. Indirect fire losses are computed using the artillery models. The three indirect fire models are the Target Acquisition Model (TAM), the Red Artillery Model (RAM), and the Casualty Assessment Model (CAM). A detailed analysis of materiel items expected within WP artillery range led to defining 22 artillery vulnerability classes. Items of equipment found in the theater forward area can each be equated to one of these 22 vulnerability classes. For each class of equipment, a representative item was selected that best characterized the class. As an example, Class 2, light armor, was represented by armored personnel carriers because the carriers made up 85 percent of all light armor population in that class. Lethal areas for each type of WP artillery system against each of the representative items of the 22 vulnerability classes are furnished by the US Army Materiel Systems Analysis Activity (USAMSAA) and represent equipment damage so severe that replacement of the representative item was required. The lethal areas are the basis for loss assessment in the CAM.

(4) ELCON. The losses assessed by the simulations and historical data (for losses to types of equipment not simulated) are entered into the the SYMWAR loss matrix. Using the posture sequences developed for US forces in the CEM, attrition rates are computed by summing the losses over time. The foregoing and intertheater and intratheater logistic loss factors are applied in the ELCON program. Wartime replacement factors (WARF) are defined as follows:

$$\text{WARF} = \frac{\text{Nonrepairable item losses for a given time period}}{\text{Time period x avg item TOE strength}}$$

D-3. INPUTS AND SOURCES

a. A summarized portrayal of AMMO/WARF input data and its sources is displayed in Figure D-5. If the Department of the Army staff is considered as a single data source, the total of the AMMO/WARF study inputs could be said to have derived from eight separate agencies or source documents (the 14 sources on Figure D-4 are grouped to 8). For perspective, the reader may refer the total of input data categories provided to the CEM alone as reflected in Appendix C, Table C-1.

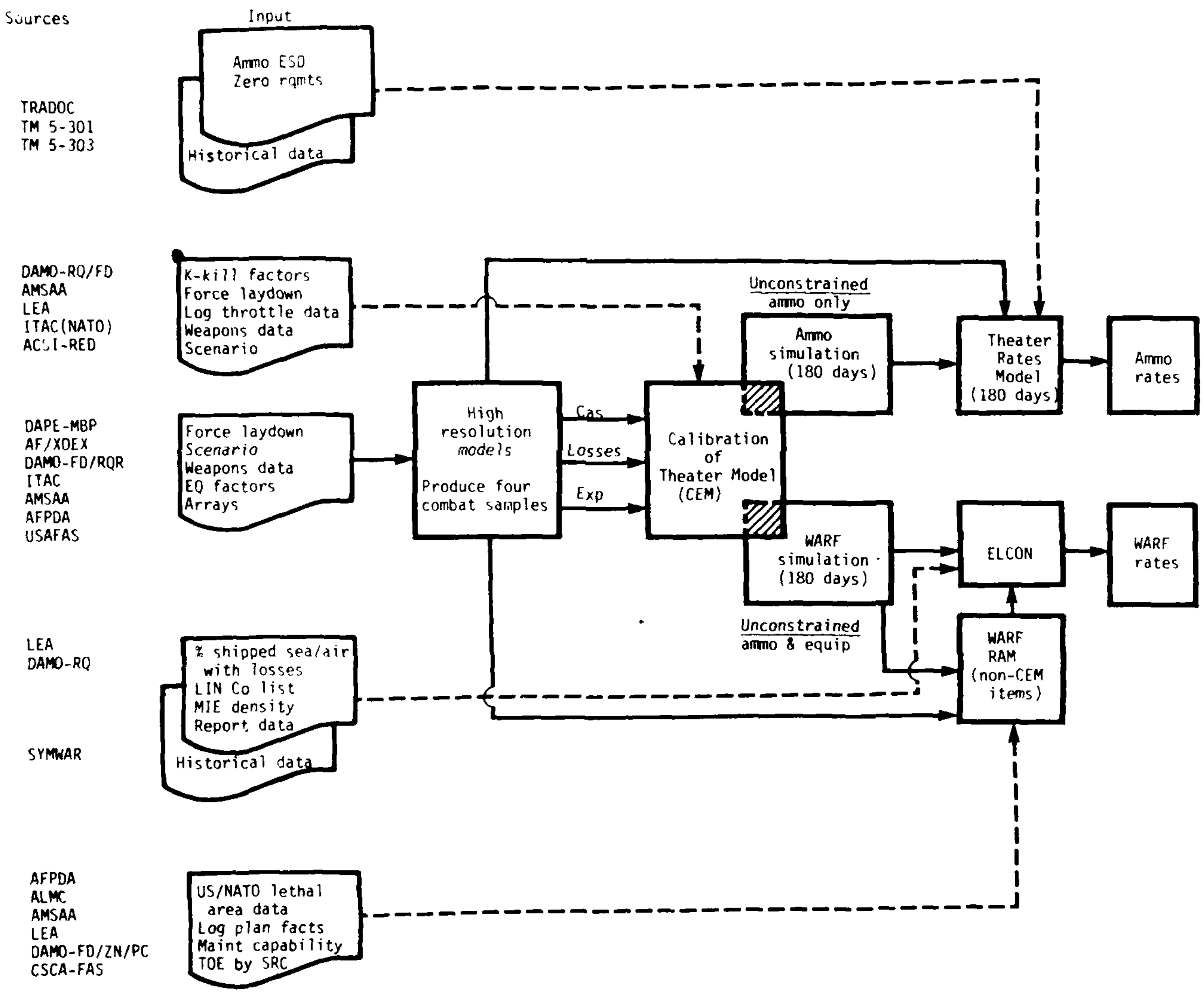


Figure D-5. AMMO/WARF Data Input Sources

b. Input data is approved and/or provided at specific calendar points commensurate with the need to start the study and the necessity to utilize the most current data available.

D-4. KEY ASSUMPTIONS

a. The key type assumptions applied to the AMMO/WARF study are those dictated by the approved scenario and threat and those stated directly by the tasking directive. The major key assumptions are displayed in Figure D-6.

b. Other data development type assumptions (largely historical or test bed) of the form discussed in Annex C are imbedded in the data sources.

c. Excursions to design base case studies may include other type assumptions.

d. All major assumptions applied to a study are clearly stated in the text of the study report.

D-5. SENSITIVE PARAMETERS. Sensitive parameters are highlighted as those processes or elements of data that have a significantly marked effect on the results achieved by the analysis. The most sensitive parameters of the analysis, based on actual sensitivity testing or the judgment and experience of analysts, are those indicated in Figure D-7.

D-6. OUTPUTS

a. AMMO/WARF type outputs are listed at Table D-1.

b. As in the case of the Total Army Analysis, Appendix C, a line by line flow of input data through the methodology to output cannot reasonably be provided. The study input/output is viewed in terms of its character, source, and the validity of the methodology to which it is applied or derived.

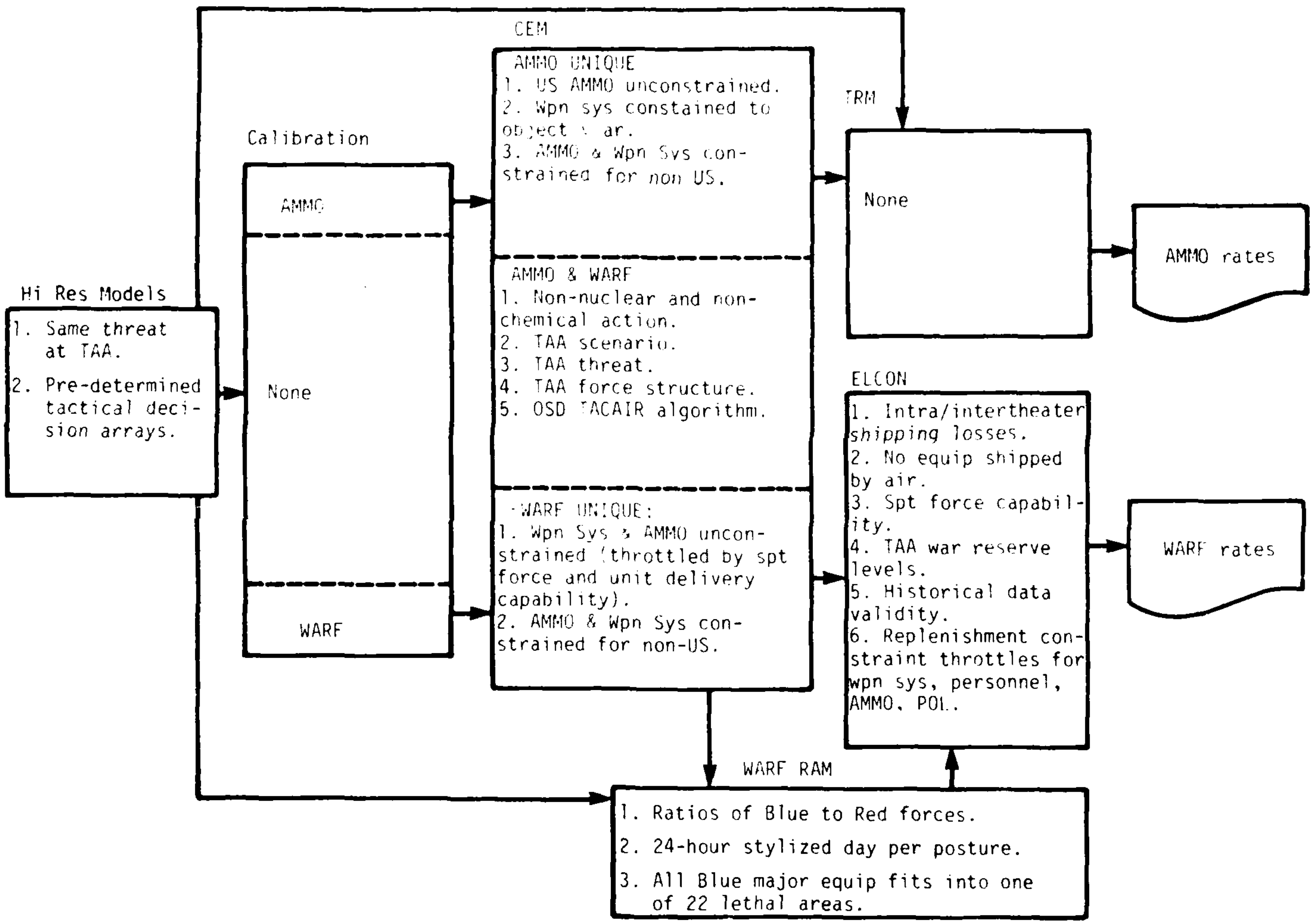


Figure D-6. Type Key Assumptions (base cases)

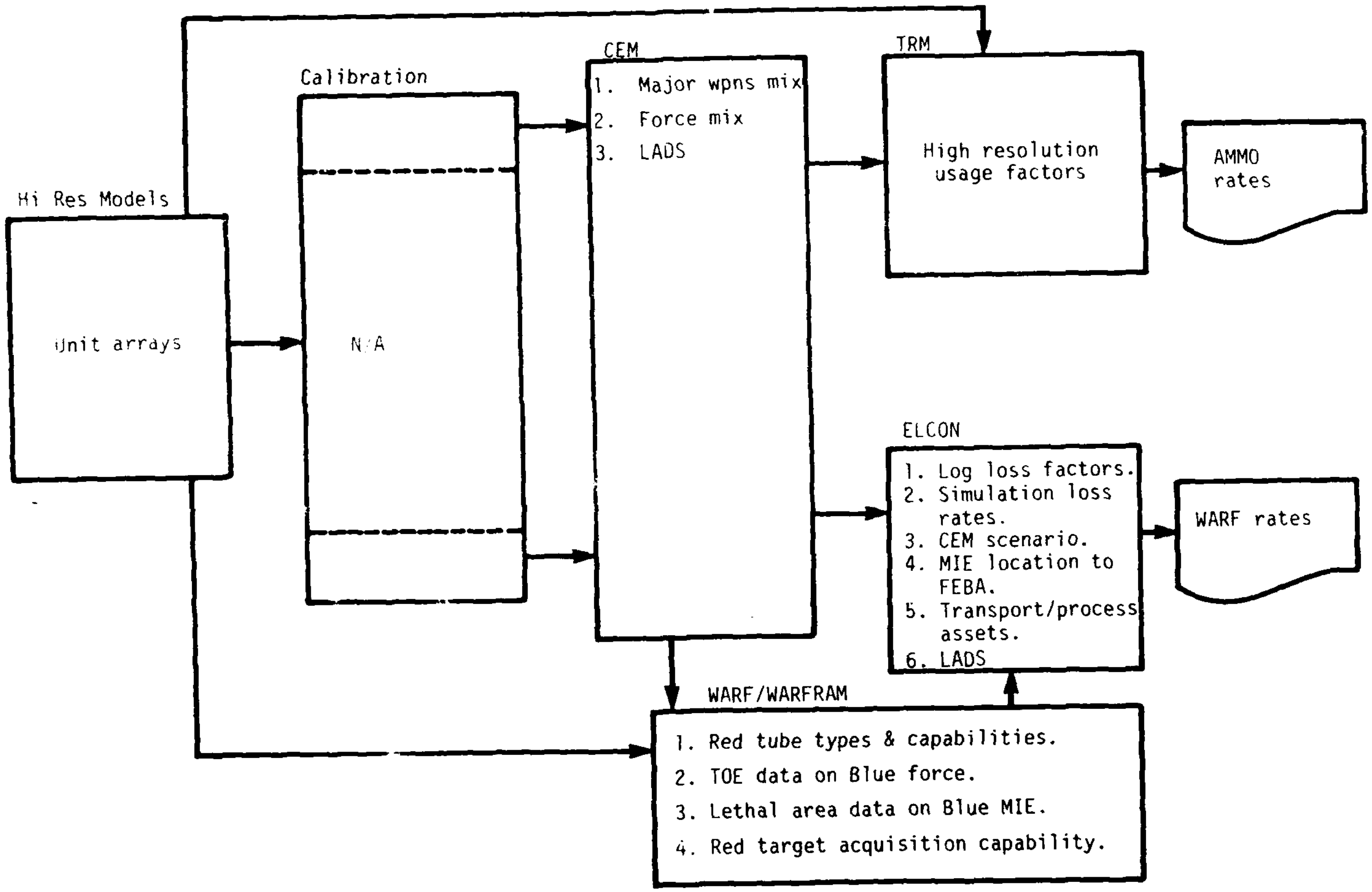


Figure D-7. Sensitive Parameters - AMMO/WARF

Table D-1. AMMO/WARF Type Outputs
(page 1 of 3 pages)

Firepower Ratios, NORTHAG and CENTAG, P-86E
Summary of Theater Combat Postures, US Forces, 180 Days, P-86E
Distribution of WP Combat Activity for D-day to D+60
Small Arms Ammunition Expenditures
Ammunition Allowance per Weapon for Rear Area Security
BUSHMASTER Ammunition Expenditures (D-day to D+60)
Missile Ammunition Expenditures (D-day to D+60)
Mortar Ammunition Expenditures (D-day to D+60)
105mm Tank Ammunition Expenditures (D-day to D+60)
Artillery Ammunition Expenditures (D-day to D+60)
Selected Mine Expenditures (D-day to D+60)
Distribution of WP Armored Vehicles Destroyed, 60 Days
Cells Replaced by Combat Simulation
WARF Categories for CEM Primary Direct Fire Weapon Systems
WARF Artillery Model Vulnerability Classes
Distribution of US Combat Activity (P-86B/P-86E)
Items Identified for CEM Equivalency
WARF--M109A1 Howitzer, M813 Truck
WARF--M125A1 Mortar Carrier
WARF--M60A1/A3 Tank and XM-1 Tank
WARF--M113A1 APC and XM-2 IFV
FEBA Trace - P-85 (Ammo)
FEBA Trace - P-86B and P-86E (Ammo)
Factors to Determine Ammunition Lost in the Intratheater Logistic Systems
Ammunition Allowance per Weapon for Rear Area Security
Total US Fixed Wing Aircraft in AFCENT Sector on D-day
Total US Fixed Wing Aircraft Deployments to AFCENT
Total Warsaw Pact Aircraft in AFCENT Sector on D-day
Stylized Ammunition Expenditures
US Stylized Losses
WP Stylized Losses
WP Deployment
In-theater WP TOE Personnel and Equipment Opposing US Forces, P-86E (cumulative)
In-theater WP Replacement Personnel and Equipment Opposing US Forces, P-86E (cumulative)
Personnel Target Hardness Categories
Target Categories
Maximum Number of Batteries to be Massed Against a Target--105mm Howitzer
Maximum Number of Batteries to be Massed Against a Target--155mm How and 8-in How
Maximum Number of Launchers to be Massed Against a Target--MLRS
Artillery Floors (P-86E)

Table D-1. AMMO/WARF Type Outputs
(page 2 of 3 pages)

RAAM Expenditures
ADAM Expenditures
Upper Limits for Unit Resource Definition
Upper Limits for Weapon Resource Definition
Major Weapons Systems Simulated in CEM
Daily Capability of a Full TOE Heavy Materiel Supply Company (TOE 29-127)
US Equipment Throttle (deprocessing capability--LEA)
Type Vehicles in Tank Equivalents
US Equipment Throttle by Tank Equivalents (deprocessing capability--CAA)
Barrier and Denial Material
Military Construction Material Items
Small Battle Material Items
Comparison of WP Divisions on Line to Those Committed Against US Forces, P-86E
Total WP Major Weapons Facing AFCENT
WP DP-ICM Capability
US Personnel and Equipment Deployments and Replacements
Miscellaneous Items with Rates Computed from Historical Data
Miscellaneous Items with Rates Computed by Special Method
Facilities Required for Artificial Obstacles, 100 square miles
Facilities Required for Artificial Obstacles, 225 sq km
Extracted Material Listing for Barrier Facilities
Adjusted Material Listing for Barrier Facilities
Items Used with 16,885 Manhours Effort in a Stylized Brigade Zone
Items Used in the Stylized Brigade as a Portion of Available Effort
Facilities Required for Artificial Obstacles (225 sq km), US Forces
Extracted Material Listing for Barrier Facilities
Items Used in a Stylized Brigade Zone
Items Used in a Stylized Brigade as a Portion of Available Effort
Construction Dynamite Requirement, Based on Quarrying Capacity
Allocation of Military Construction Dynamite Requirement
Requirements for Selected Construction Items
Factors for Additional Construction Items
Additional Construction Requirements for 180-day War
FASCAM Daily Requirements in Support of Platoon Size Defensive Positions, DE and DI Postures
MOPMS Requirements

Table D-1. AMMO/WARF Type Outputs
(page 3 of 3 pages)

Platoons Engaged
Platoons in Smoke Battles
Daily Requirements, Miscellaneous Items by Platoon and Posture
Stylized Requirements, Small Battle Material
Requirements for Bulk Rate Items by Posture, On Day
Requirements, 180-day War
TACAIR
Stylized Expenditures, Combat Losses, and Logistical Data
Stylized Losses
Application of Concepts Evaluation Model (CEM)
US Equipment Replacements, WARF P-86
Bulk Allotment Items

Section II. WARTIME REQUIREMENTS FOR AMMUNITION, MATERIEL, AND PERSONNEL (WARRAMP)

D-7. DISCUSSION

a. The purpose of the WARRAMP methodology, or system of models, is to forecast the Army's requirements for nonnuclear ammunition, materiel, and personnel to fight a future conflict. The requirements forecasts made by WARRAMP are intended for use by the Department of the Army in the development of Army programs. WARRAMP is planned to replace current AMMO/WARF procedures.

b. The enhanced WARRAMP methodology is depicted in Figure D-8. The seven high resolution models, utilized in the AMMO/WARF methodology, are effectively combined in the single Combat Sample Generator (COSAGE) Model; attrition routines have been enhanced to represent an integrated battlefield; enhancements have been made to the CEM to facilitate calibration; a Personnel Postprocessor (PPP) methodology has been added to develop personnel losses; a function not previously performed by the AMMO/WARF methodology; and an Ammunition Postprocessor has been developed that eliminates the need for the Theater Rates Model.

c. While further enhancements are being planned, the WARRAMP methodology as stated is programed to be available to support the 84-88 POM.

D-8. METHODOLOGY AND KEY COMPUTATIONAL STEPS

a. The overall WARRAMP methodology, Figure D-8, can be seen at a glance to have had its origin in the AMMO/WARF methodology, Figure D-1; Figure D-9 depicts the key computational steps of the WARRAMP methodology.

b. Overview. WARRAMP attempts to forecast the resource requirements for a future conflict by fighting the war through simulation and counting rounds of ammunition expended, equipments lost, personnel casualties experienced, and fuel consumed. A high resolution, stochastic model (COSAGE) simulates ground combat at the division level for 24 simulated hours. Data from the division simulations representing various tactical postures constitute combat samples. The samples provide input data for calibration of the theater level model, CEM. The calibration procedure causes the theater model to employ the firepower and vulnerability characteristics of weapons and equipment which were derived in the division level simulation. The theater level model simulates operations for a campaign of the desired length. The results of the division and theater models are then combined and extrapolated by a group of postprocessor programs to develop the detailed information which can be used in the decision process to develop Army programs.

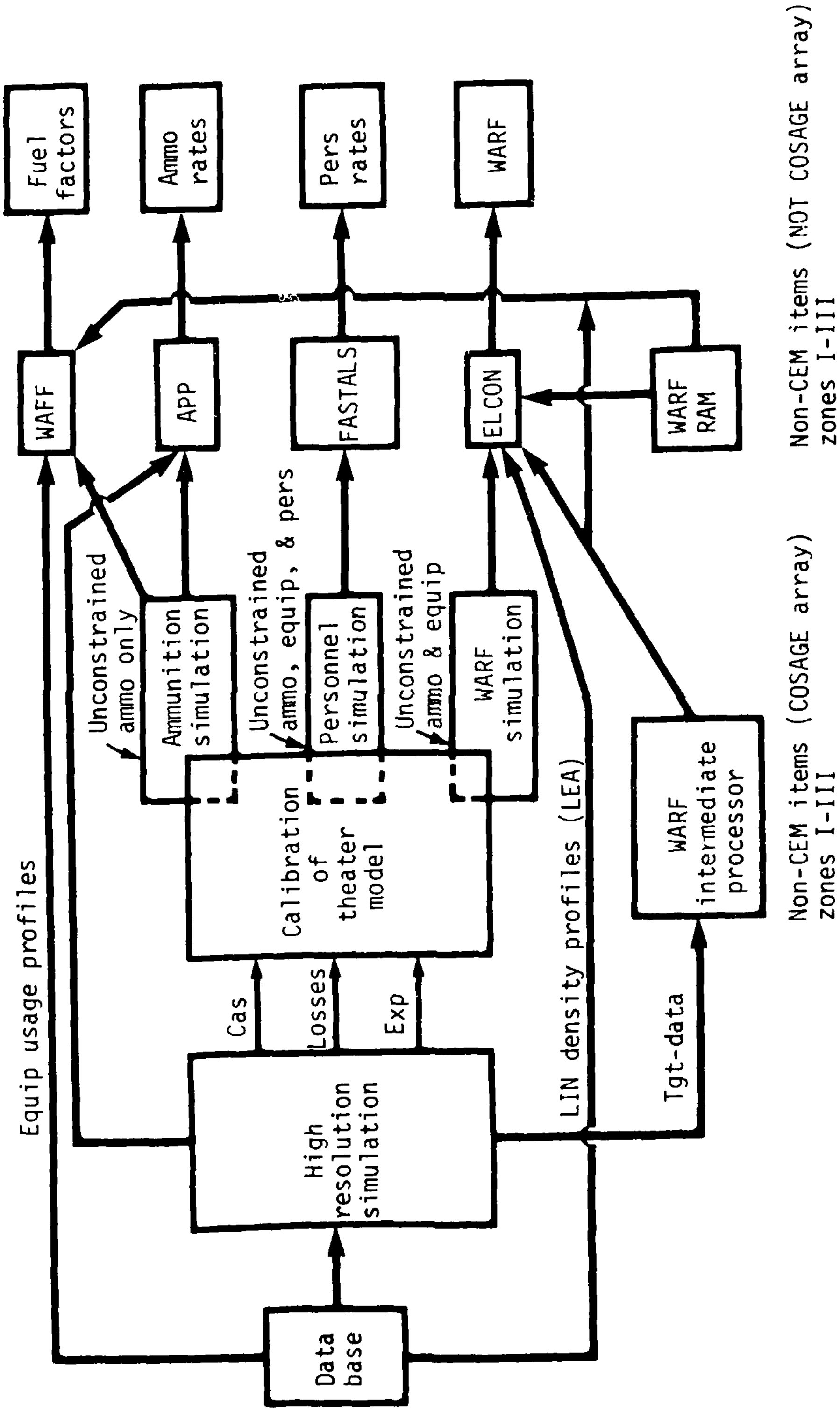


Figure D-8. Methodology Flowchart - WARRAMP

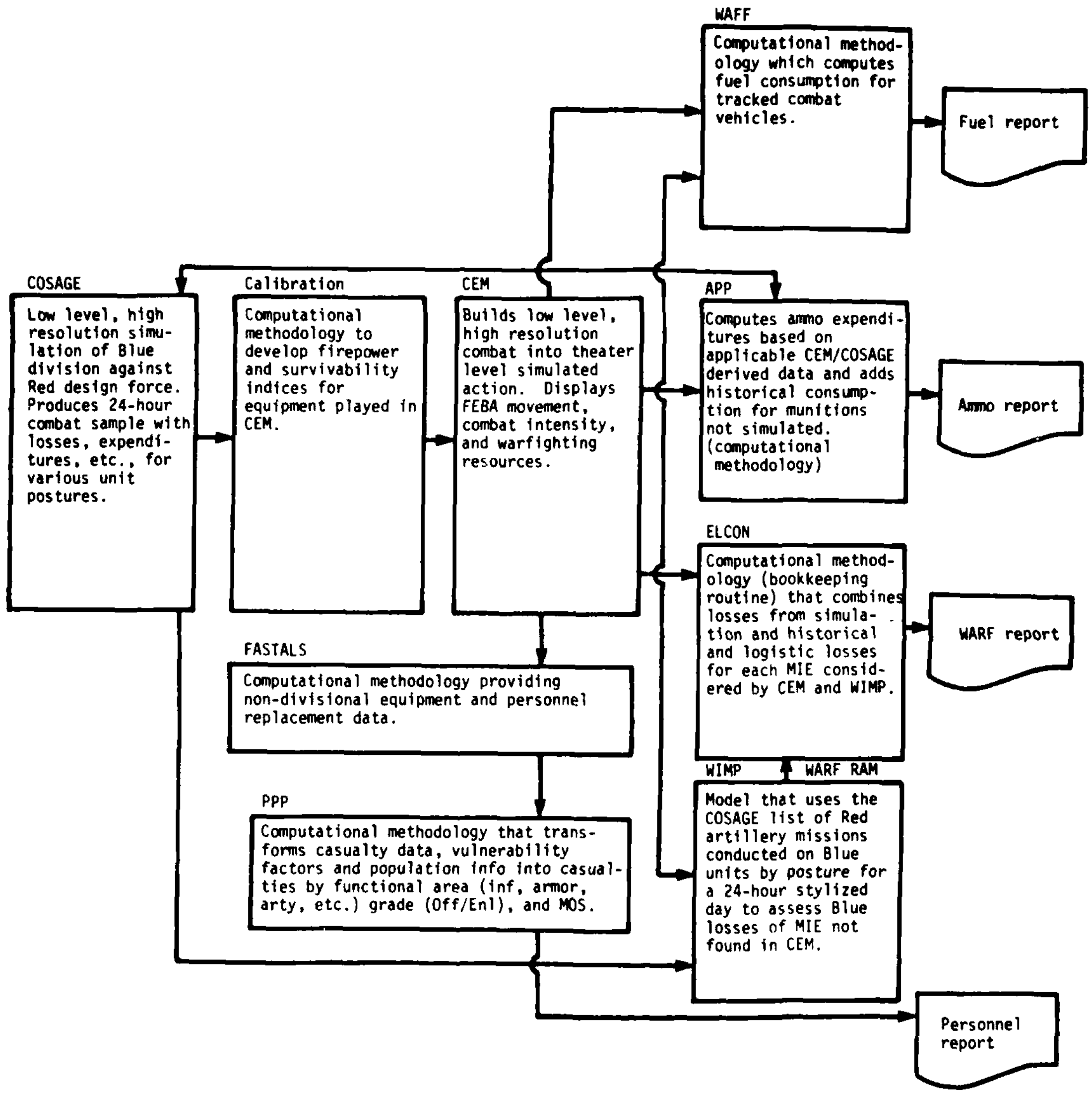


Figure D-9. Narrative Methodology - WARRAMP

c. High Resolution Gaming

(1) High resolution gaming is conducted using the Combat Sample Generator (COSAGE) simulation model. The COSAGE Model simulates a 24-hour battle between a stylized Blue division and a stylized Red force. Each 24-hour battle represents the opposing forces in a given posture, such as Blue attack-Red defend, or Red attack-Blue delay. The results of these 24-hour battles are used as inputs for theater level gaming and for ammunition and materiel processing.

(2) The lowest level of unit played is the platoon with individual weapons systems (e.g., tanks, antitank guided missiles) represented as entities which fire and suffer attrition. Maneuver, target acquisition, firing of both direct and indirect fire weapons, and attrition are fully integrated in the simulation. Units maneuver in response to tactical orders which are developed in advance. The orders have a contingency structure which modifies the flow of action based upon events as they occur. The principal outputs of COSAGE are a killer/victim scoreboard, graphical plots of unit positions at various times during the simulated day, detailed records of ammunition expenditures, and summary information on small unit battles.

d. Theater Gaming. Theater level gaming consists of a set of utility routines (analagous to the AMMO/WARF usage of the term "calibration") called CORK and the low-resolution, theater level, combat simulation called Concepts Evaluation Model (CEM). CORK uses the killer/victim scoreboards provided by COSAGE, computes firepower and survivability outputs to CEM. CEM supplements this with additional data, such as deployment, threat, and non-US NATO data, and then simulates a 180-day war. Additional enhancements have been made to the CEM which will be discussed in Section III.

e. Ammunition Postprocessor (APP). The APP is one of the three postprocessors of the WARRAMP system. It is used to compute ammunition requirements for a theater level conflict. Its end results are the same as the present TRM. Both APP and TRM use the same report generator. The APP uses direct outputs from the Concepts Evaluation Model V (CEM V) to define weapon system activity level and attrition and the COSAGE for high resolution gaming results. The data is used to develop selected ammunition requirements over time based on deployments, replacements, weapons engaged, and kills.

f. Materiel Processing. Materiel processing consists of a WARF buffer, ELCON, and a WARF Intermediate Processor (WARF IP). The WARF buffer is a set of utility routines that secures the required input data from the CEM output files and reformats them for use in ELCON. The WARF IP will take indirect fire data, munitions data, and unit status data directly from COSAGE and compute nonfiring system losses due to artillery and tactical air. ELCON, in turn, produces the WARF reports, which are loss rates by time period for each line item of equipment (LINCODE) being represented in the study.

g. FASTALS. The FASTALS Model may be used in any force planning simulation to develop a force that is balanced, time-phased and geographically distributed. The troop list generated by FASTALS is said to be balanced when the individual units comprising the lists are capable of accomplishing the various workloads generated by the total force. Troop lists are said to be time phased when a complete troop list is computed for each time period in the simulation. Support to combat units is defined as the logistical and administrative service support necessary to support a tactical activity. The major elements of support are maintenance, construction, supply, transportation, storage, and personnel replacement. Requirements for units performing these functions are derived from the workloads of the units which are generated as a function of the combat force deployment, theater conditions, and the tactical operations as developed in the warfighting model. The FASTALS Model uses the results of a combat simulation as the starting point for the roundout process. Combat data required for the FASTALS simulation indices identification of all factors related to combat units including strength, location, and unit identification number; the deployment of these units, the location of units within the theater; and the intensity of tactical activity of each unit by day expressed as intense, normal, reduced, or reserve. These data define the basic support parameters of the combat units.

h. Personnel Postprocessor (PPP). The PPP provides a methodology for distributing aggregated losses across all theater MOSs with recognition of apportionment densities on the battlefield and vulnerability factors. It defines replacement requirements in terms of time, three-digit MOS, officer, warrant officer, and enlisted categories. As used in WARRAMP, the PPP will utilize selected outputs of CEM and FASTALS to define replacement requirements for combat and support personnel, respectively. Final output is generated by the Fort Benjamin Harrison FBH Model provided by ADMINCEN of Fort Benjamin Harrison. FBH utilizes approximately 10 minutes of computer time and 40K of core memory to execute on CAA's UNIVAC 1108. The program was written specifically for CAA usage in WARRAMP as a TRADOC postmobilization training project in 1977 and was delivered in June of that year.

i. Wartime Fuel Factors (WAFF). The WAFF Model is used to compute diesel fuel expenditures for tracked combat vehicles in the theater combat environment (CEM). Fuel expenditures are used to compute fuel factors based on the numbers of authorized vehicles in the theater. The CEM scenario and engagement report data serve as input along with stylized day loss rates and permanent kills developed in the WARF, RAM, and COSAGE profiler for each vehicle type as provided by TRADOC.

D-9. INPUTS AND SOURCES

a. A summarized portrayal of WARRAMP input data and its sources is displayed in Figure D-10.

b. The major differences in the WARRAMP input from AMMO/WARF input is additional detailed division level tactical operation orders for COSAGE and the data required for the PPP. The data and sources for the PPP are essentially those employed in the past for the development of personnel loss data in the Total Army Analysis (TAA) Study.

D-10. KEY TYPE ASSUMPTIONS

a. The key assumptions to be applied in use of the WARRAMP methodology will be those indicated by the approved scenario and threat, and those stated directly by the tasking directive. Key type assumptions are displayed in Figure D-11.

b. The same historical or test bed type data assumptions applied to the TAA and AMMO/WARF studies also apply to WARRAMP (see Annex C).

c. All major assumptions applied in use of the WARRAMP methodology are included in the text of the final report.

D-11. SENSITIVE PARAMETERS. The most sensitive parameters of the WARRAMP methodology are those depicted in Figure D-12. Their selection is based on sensitivity testing or the experience and best judgment of analysts.

D-12. WARRAMP OUTPUTS. Report outputs from the WARRAMP methodology will take the form of AMMO/WARF outputs (Section I, this appendix) with the additional personnel data output of the form provided by the TAA Study (Annex C).

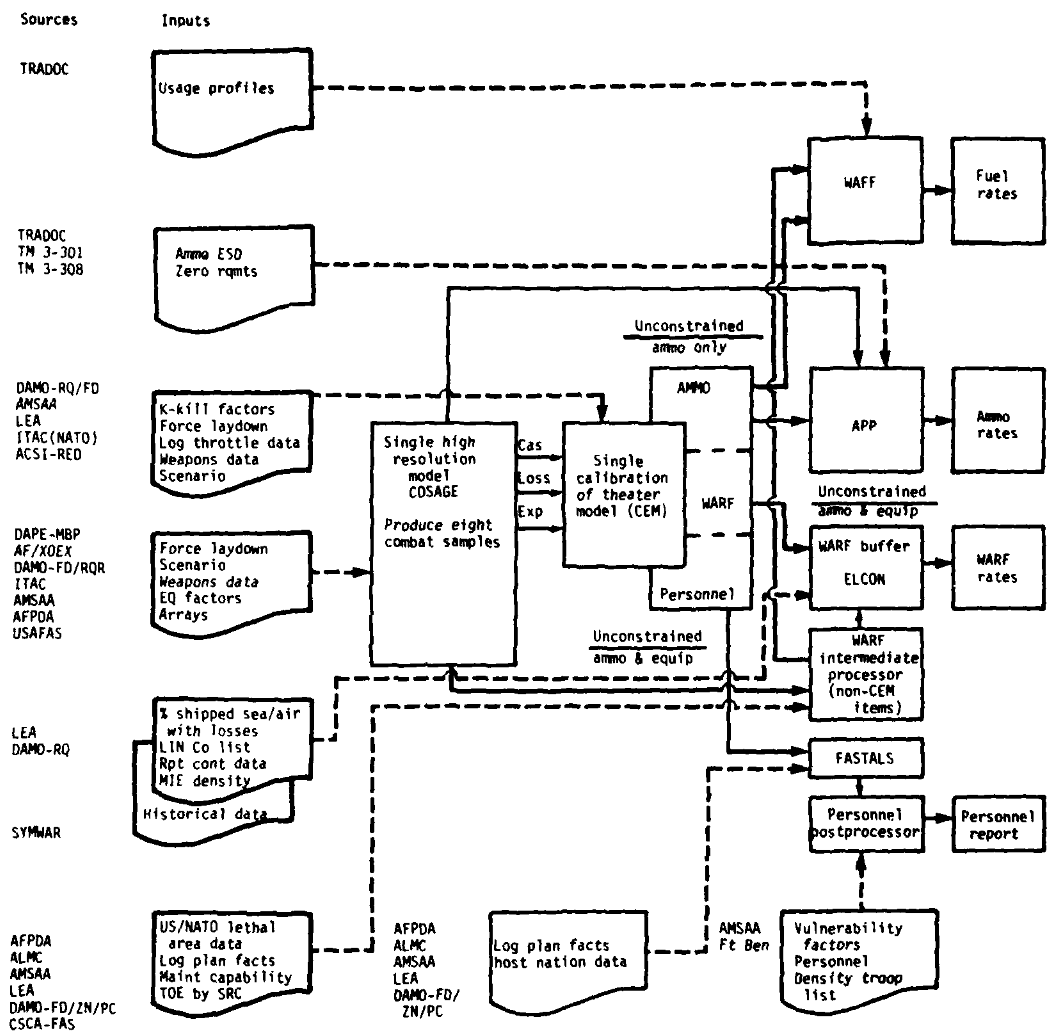


Figure D-10. WARRAMP Data Input Sources

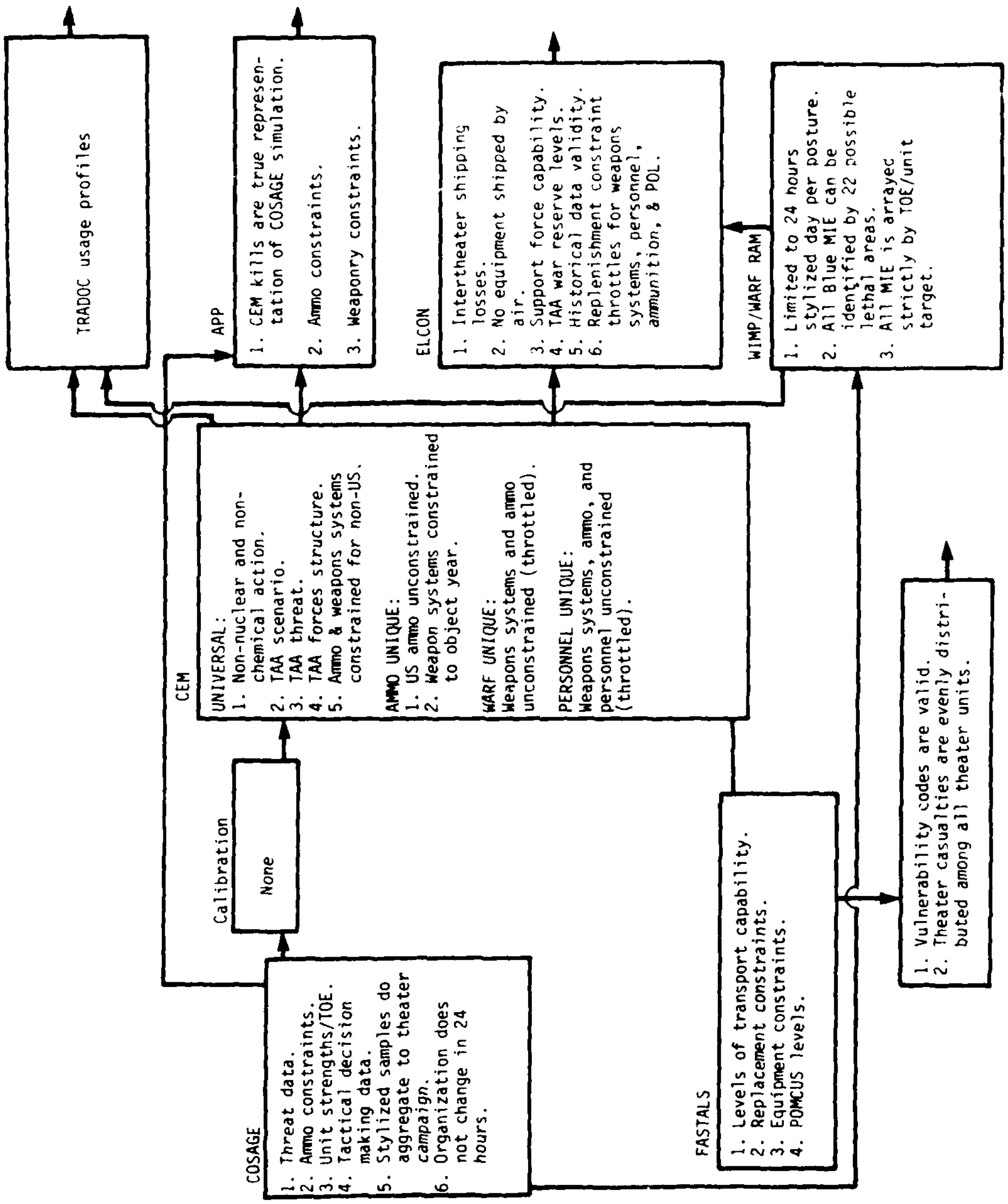


Figure D-11. Type Key Assumptions - WARRAMP

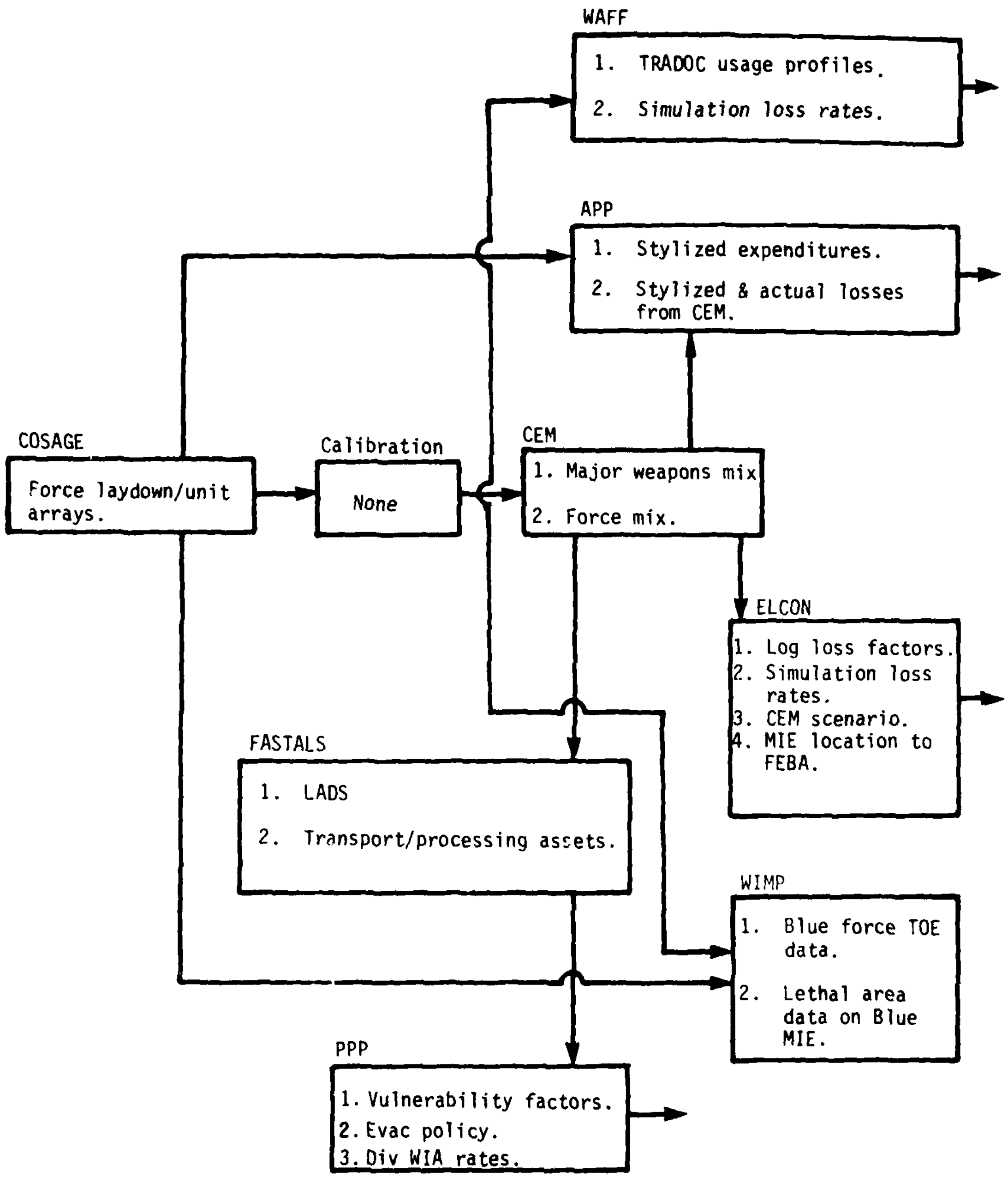


Figure D-12. Sensitive Parameters - WARRAMP

Section III. AMMO/WARF-WARRAMP METHODOLOGY COMPARISON

D-13. OVERVIEW. While the AMMO/WARF (AMMORATES/WARF) methodology has withstood the test of time and was once state-of-the-art, it has become difficult and time consuming to iterate and has been criticized in several areas. It does produce wartime ammunition and materiel requirements from an objective base. The intent of the development of WARRAMP is to preserve the strengths of AMMO/WARF while improving the weak areas. Outlined in this section is a comparison of the two methodologies from the perspective of the improved capability of the WARRAMP methodology to ensure consistency.

D-14. WARRAMP SALIENT GUIDANCE

a. The WARRAMP methodology was developed under the following attendant guidance:

- Interactive high resolution model methodology
- Responsive to DA planning/programing needs
- Rapid results
- Clear input/output audit trail
- Adaptable to varying scenarios
- Versatile so it can be used for other purposes
- Quick excursion

b. While not all of the above intentions may be met to the fullest extent, several bear directly on the ability to maintain consistency.

D-15. INTEGRATED METHODOLOGY

a. Figure D-13 represents WARRAMP's replacement of the seven separate AMMO/WARF high resolution models by the single interactive COSAGE Model. Analysts need no longer develop seven separate data bases and run seven models. The single interactive COSAGE Model with one data base clearly offers an improved degree of consistency for the data input with respect to force structure, weapons effects, etc.

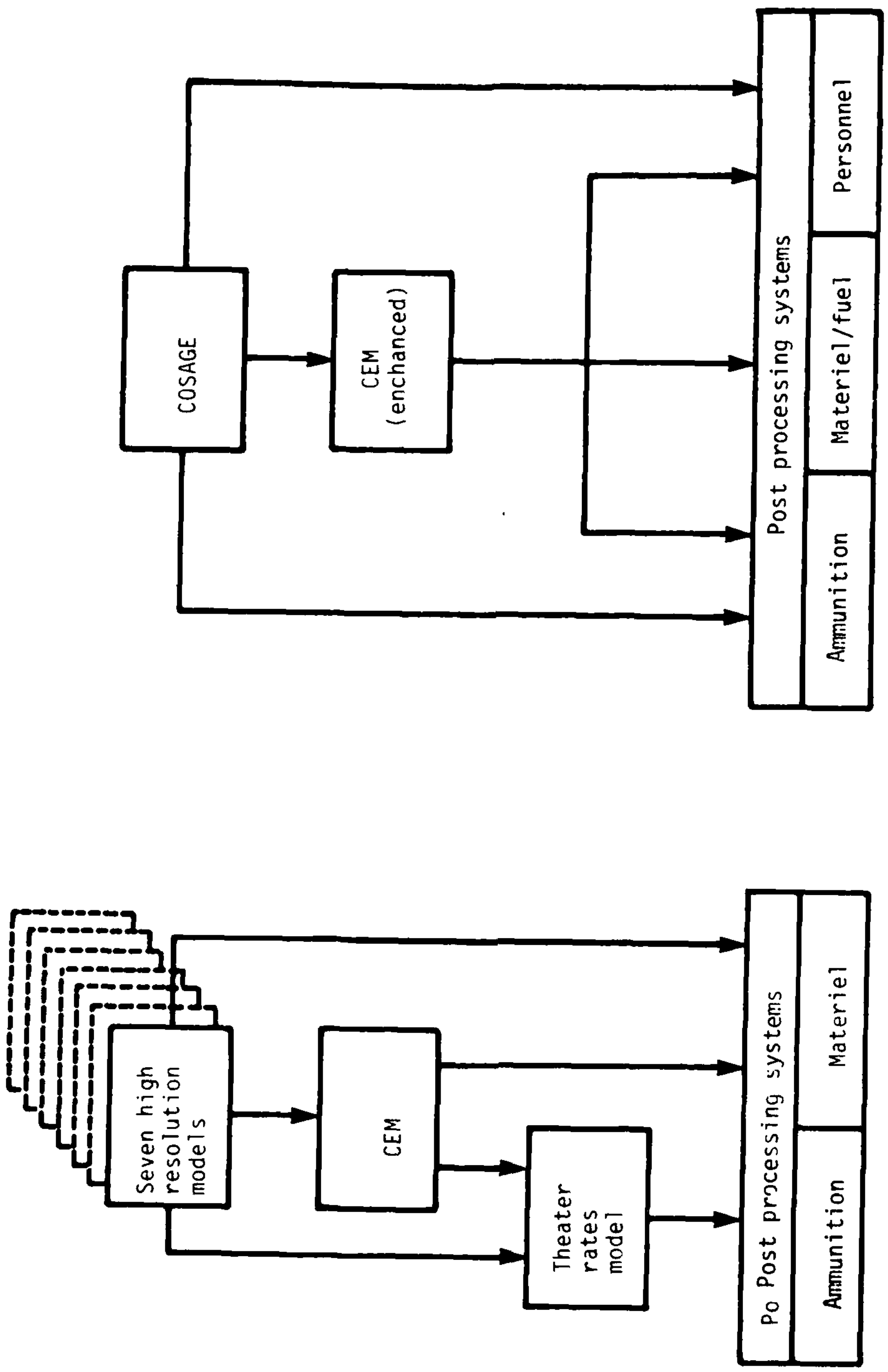


Figure D-13. Streamlined Nature of WARRAMP Methodology

b. Unlike AMMO/WARF, which had no capability to determine casualty rates the interactive WARRAMP methodology will develop personnel replacement data from the same single data base and scenario used for development of ammunition and WARF rates.

c. WARF and AMMO rates are derived from two separate theater level models within AMMO/WARF--the CEM and TRM. In the WARRAMP methodology, all wartime requirements are dependent on the single theater level model (CEM), thus assuring consistency.

D-16. RAPID RESULTS/RESPONSIVE/QUICK EXCURSIONS. The AMMO/WARF methodology falls short in these regards. This objective guidance fosters consistency by demanding that the WARRAMP methodology be capable of being accomplished within a short timeframe. If basic data can be loaded and the methodology executed rapidly, accurate and up-to-date input data can be better utilized. There will be less need and inclination to change to newer data in latter stages of execution of the methodology if the entire process can be performed in less than several months. Additional time will be afforded for excursions and/or follow-on studies to be conducted with the data desired, thereby assuring consistency with intent of the studies as well as providing essential time.

D-17. CLEAR INPUT-OUTPUT AUDIT TRAIL

a. Due to the large number of high resolution models, manual calibration methodology, and development of personnel requirements data under a totally different methodology (TAA), it is difficult with AMMO/WARF to align input to output and associate varying results to cause. The integrated WARRAMP methodology with added calibration automation (CORK, improved CEM) and single high resolution model will enable the experienced analyst to more readily view the direct effects of variance of selected data input to the output obtained.

b. Consistency will be derived from the direct ability to view AMMO, WARF, and personnel rates from a more consistent, clearly aligned data base.

D-18. OVERALL IMPROVED CONSISTENCY

a. The overall improved consistency of the WARRAMP methodology may best be demonstrated in the format of Figure D-13.

b. The improved capability of the WARRAMP methodology is summarized in Table D-2.

Table D-2. Improved Capability of WARRAMP Methodology

AMMO/WARF	WARRAMP
Ammo rates determined by two theater simulations (CEM-TRM)	Ammo rates determined by single theater simulation (enhanced CEM)
Gamer judgment determines sequence at outset of high resolution models	COSAGE Model portrays task organization through reinforcement
Four postures Attack Defense intense Defense light Delay	Eight Postures Active defense (by range) Active defense (short range) Hasty attack Deliberate attack Counterattack Delay Movement to contact Defense light
Model resolution to Blue co/ Red co	Model resolution to Blue plt/ Red co
Stationary targets	Dynamic targets
Personnel rates developed under different scenario from AMMO & WARF	All three rates produced by some scenario
Numerous high resolution data structures	Single (larger) high resolution data structure (COSAGE)
Wartime fuel factors not computed	Wartime fuel factors computed

APPENDIX E

STRUCTURE AND COMPOSITION SYSTEM (SACS)

E-1. PURPOSE. The Structure and Composition System (SACS) is a series of automated computational programs which apply the detail contained in TOE, TAADS, and BOIP files to the time-phased force structure depicted in the FAS and project time-phased demands for personnel and equipment. The PERSACS depicts time-phased requirements and authorizations for personnel at grade, branch, and MOS level of detail. The LOGSACS performs a similar function for equipment at the LIN level of detail. Both PERSACS and LOGSACS are key inputs to the requirements processes aimed at identification of needed personnel and equipment.

E-2. DESCRIPTION. The SACS is a network of computer programs and procedures which combine information from several Management Information Systems (MIS) to provide the personnel and equipment requirements/authorizations needed for a specified force structure.

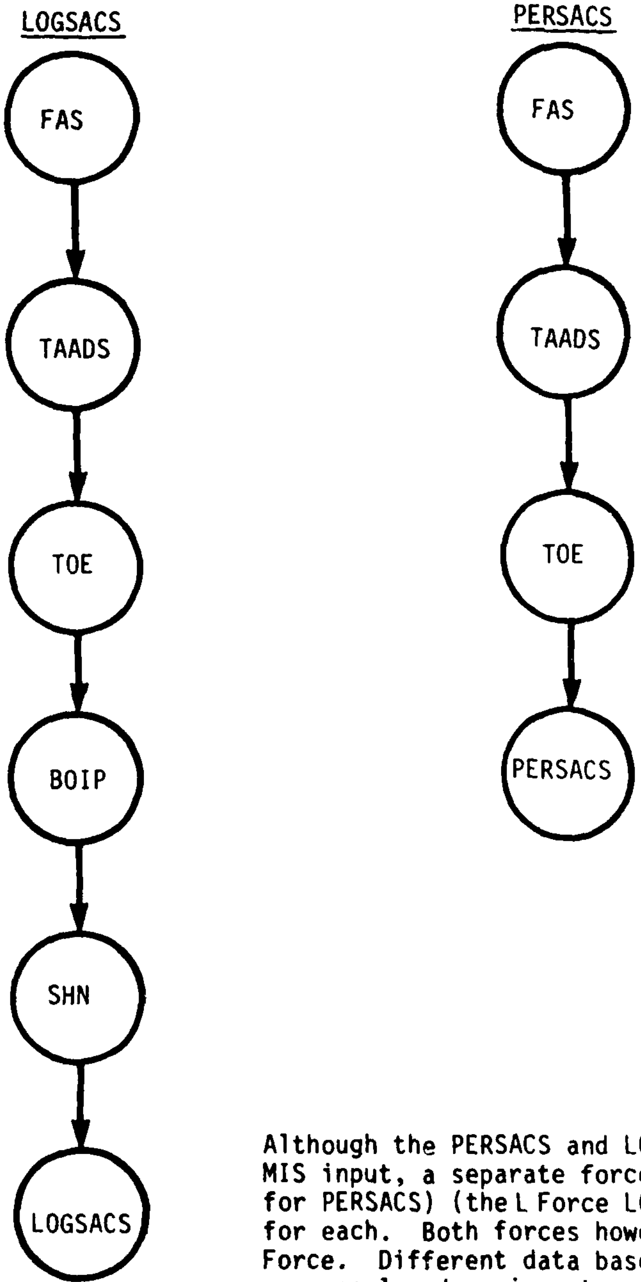
- Most MIS are called data bases, meaning they are semipermanent in nature and receive scheduled transactions to keep them current.

- SACS is not a data base. Each SACS is developed for a specific purpose and is not subsequently updated. Normally the SACS covers a 7-year period, e.g., current and budget year and 5 years beyond. As an example, the 83-87 POM LOGSACS covers the program years 83-87 plus the current year 81 and the budget year 82.

a. <u>SACS Input Files</u>. There are five input files used in the computation of a LOGSACS, while only three are used in PERSACS (see Figure E-1).

LOGSACS	PERSACS
FAS	FAS
TAADS	TAADS
TOE	TOE
BIOP	
SHN	

The functional role played by these files is described in the following paragraphs.



Although the PERSACS and LOGSACS have common MIS input, a separate force (the P Force for PERSACS) (the L Force LOGSACS) is created for each. Both forces however match the M Force. Different data bases are required for personnel and equipment.

Figure E-1. SACS Computations

b. Force Accounting System (FAS)

(1) The FAS is a listing of all of the TOE and TDA units in the Total Army (Active Army, National Guard, Army Reserves, and Unmanned). FAS retrievals permit detailed and summary analysis of the Army force structure to include organization, unit function, and strength data. There is no equipment or personnel detail in the FAS; however, the data base includes over 100 categories of unit information which can be extracted selectively for analysis. Key elements of information in addition to required and authorized strengths by identity are: Unit Identification Code (UIC); Effective Date (EDATE); Location; Force Planning Code; Program Element; Troop Program Sequence Number; Standard Requirements Code (SRC).

(2) The most important roles played by FAS in the SACS process are:

- FAS determines whether an MTOE (from TAADS) or a TOE will be used for each timeframe.
- FAS determines the applicable timeframe for each TAADS or TOE record being used.

c. The Army Authorization Document System (TAADS)

(1) TAADS contains the current and proposed authorization documents for units already organized or scheduled for proximate activation.

(2) Each TAADS document contains both the required and authorized quantities for personnel and equipment details.

(3) TAADS is the only true authorization document (for requisitioning purposes). When the TOE is used in lieu of the MTOE, it is for planning purposes only, representing an estimate of the future authorization.

d. Table of Organization and Equipment (TOE)

(1) The TOE file contains the standardized tables of personnel and equipment requirements.

(2) The TOE represents the model from which the unit commander will structure his respective organization, modifying it as necessary to accommodate specific mission and environmental considerations. The resultant modified TOE (MTOE) becomes part of the TAADS system.

(3) TOE indicate personnel and equipment requirements at the 80, 90, and 100 percent levels. These levels are a guide for preparation of the authorized level of the MTOE (ALO).

(4) The TOE Master File consists of platoon level detail; a cross-reference table is supplies which indicates the number and type platoons which constitute a company and battalion. Since the FAS usually operates at the battalion level, a TOE computational file is created for SACS purposes which contains TOE ranging in size from detachments to divisions.

(5) The TOE Master File is maintained by HQ TRADOC, and the HQDA systems manager is the Requirement Programs and Priorities Division, Requirements Directorate, ODCSOPS.

e. Basis of Issue Plan (BOIP)

(1) The BOIP system is designed to project requirements for new items of equipment pending their inclusion into revised or new TOE.

(2) Data included within the BIOP are: the type units to receive the new item, the quantities of the new item, necessary associated items, and the equipment to be replaced; and the estimated availability date of the new item.

(3) When all of the TOE listed on an individual BOIP have been revised to include the new item, that BOIP is removed from the BOIP Master File and retired to the History File. Since the submission of MTOE usually lags changes to a TOE by a year or more, a BOIP computational file is created which maintains BOIP on file as long as they have a significant impact in SACS.

(4) The BOIP Master File is maintained by HQ TRADOC, and the HQDA systems manager is the Requirement Programs and Priorities Division, Requirements Directorate, ODCSOPS.

f. Shorthand Note (SHN)

(1) The SHN permits the Army Staff to add, modify, or delete equipment quantities within the SACS environment. The SHN does not change data in the input files, only the output.

(2) The SHN serves two purposes: (1) to correct errors (errors are defined as either a true error in an input file, or an undesirable result of the SACS computational process), or (2) to incorporate the latest equipment related decisions into SACS when there is an erroneous entry or insufficient time is available to change the input files.

(3) SHN are written to change quantities of equipment in specific units. Each unit to be impacted may be identified by its UIC, or the SHN may be written in more general terms such as the SRC (TOE number). In this instance, every unit having that TOE number would be impacted. Constraints of location, command, and other combinations are also permissible with this subsystem.

(4) The SHN Master File is managed by the Force Accounting and Systems Division, Force Programs and Structure Directorate, ODCSOPS.

E-3. GENERAL. The PERSACS and LOGSACS are automated computational processes (not separately maintained data bases) which act on the data contained in the FDMIS data bases. PERSACS and LOGSACS computations vary significantly enough to require separate discussion.

a. PERSACS. The PERSACS produces estimates of manpower requirements and authorizations over time. The output is provided to MILPERCEN for use in planning, programing, and budgeting for recruitment, training, and distribution of personnel and in mobilization planning. The PERSACS is the key process by which planned force structure changes are translated into a time-phased personnel distribution at the grade, branch, and MOS level of detail. Inputs to the PERSACS are the force structure reflected in FAS (to provide unit changes over time), MTOE and TDA documents in TAADS (to provide personnel grade, branch, and MOS detail), and TOE documents in the TOE system (to provide the personnel detail required when there is no appropriate TAADS document). The first step in PERSACS production is force preparation. Force and command managers within ODCSOPS ensure that the M Force is as accurate as possible. The Automated Update Transaction System (AUTS) computer program is used to ensure that FAS and TAADS data are consistent. The force is then "frozen" (copied as a separate force to be used in the PERSACS) and a specific document from TAADS or the TOE file is designated to be used as a computational basis for the personnel detail of each programed unit. Appropriate TAADS documents are applied unless the unit is newly activated or scheduled to be reorganized under a different TOE. In such cases, no TAADS entry exists and the TOE document will be used. The procedure for developing the computational base is largely automated but the results are analyzed to ensure that the best possible match is being made between unit position and document. The PERSACS computation extracts the personnel detail from TAADS and, if the authorized strength reflected in FAS matches that found in the TAADS document, states grade, branch, and MOS totals as reflected in TAADS. If the FAS authorized strength totals are different from the TAADS document (reflecting programed unit changes having been applied to FAS), PERSACS factors the TAADS personnel detail up or down to match the FAS total. For example, if a unit in FAS is programed to increase 25 percent in strength and no TAADS document has been received from the MACOM detailing that change; the grade, branch, and MOS authorization in TAADS will be factored up by 25 percent beginning at the FAS EDATE. Thus, PERSACS estimates personnel authorization changes by factoring the base data in TAADS up or down according to the strength changes reflected in the planned force structure. The end result is a picture, changing continuously over time, of the distribution of personnel authorizations by grade, branch, and MOS. A network depicting the PERSACS process is at Figure E-2.

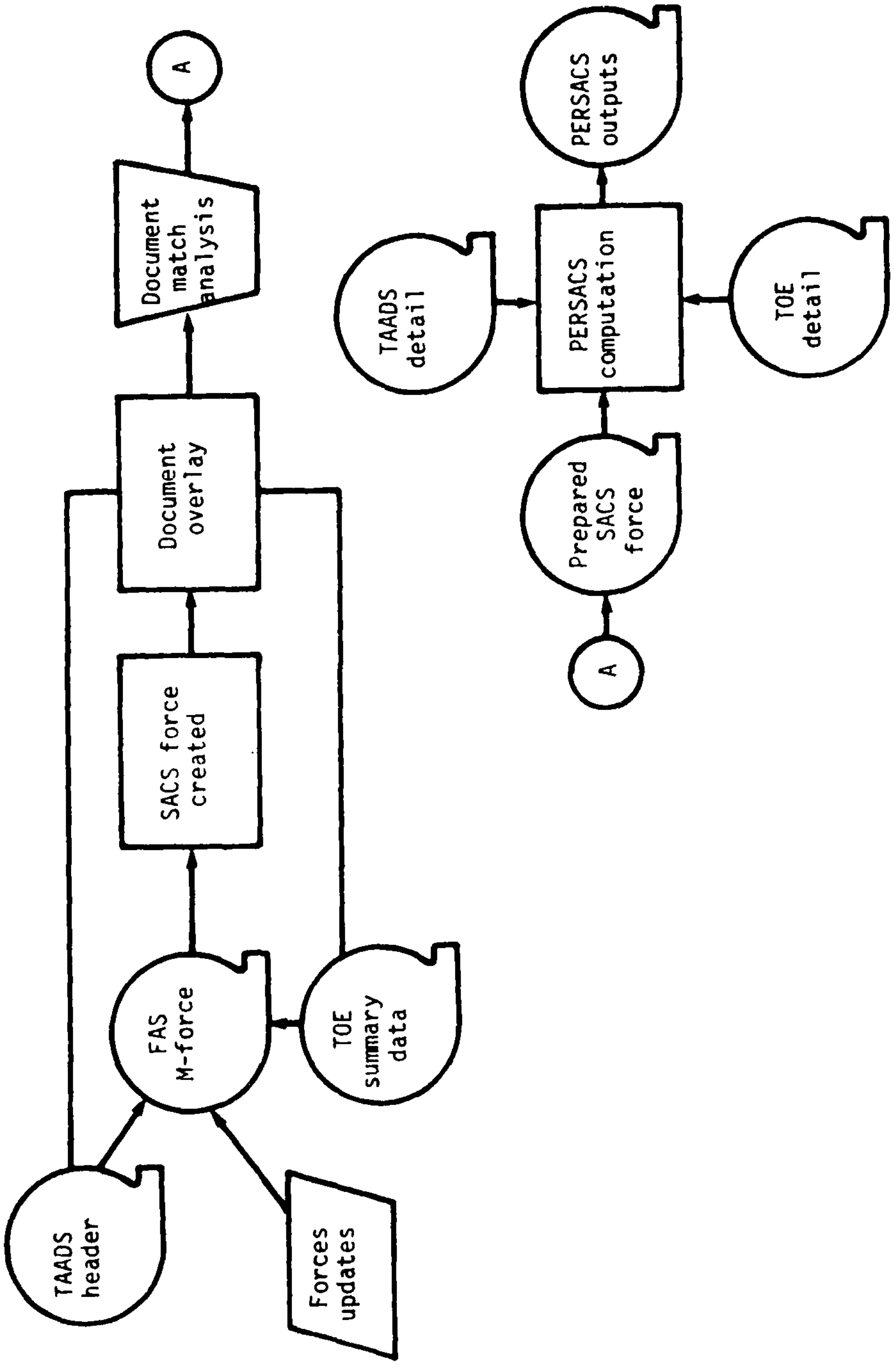


Figure E-2. PERSACS

b. LOGSACS. Force preparation activities for LOGSACS are basically the same as for PERSACS. The computational process, however, is significantly different. Inputs to the LOGSACS include the FAS, TAADS, and TOE files, as in PERSACS, but there are two additional data base inputs. The BOIP file is used to reflect changes in equipment requirements due to modernization and the Shorthand Notes (SHN) file is used to allow equipment analysts to reflect known changes not yet reflected in other files. The LOGSACS computation matches the equipment detail as reflected in TAADS or TOE documents to changes in the force structure, however, there is no factoring of equipment. Changes in equipment requirements over time are due to activations, inactivations, conversions of units, or to equipment modernization. If the LOGSACS is to be used for equipment distribution purposes only, emphasis is upon near term authorizations and the computation is stopped prior to applying the BOIP or SHN. If the LOGSACS is to be used for procurement planning, the computation continues on to change equipment requirements based on data in the BOIP and SHN files. The end result of the LOGSACS computation is a picture, continuously changing over time, of projected equipment requirements and authorizations by LIN. The output is used by ODCSRDA and ODCSLOG for developing plans and programs relating to procurement and distribution of equipment. A network depicting the LOGSACS process is at Figure E-3.

E-4. RESPONSIBILITIES. Responsibilities for the SACS process lie primarily within the HQDA staff. Output is provided to DARCOM and MILPERCEN, who have system feedback responsibility. Specific responsibilities are:

a. DCSOPS, HQDA. The DCSOPS is proponent for SACS and, as such, is responsible for the accuracy of input data. ODCSOPS personnel prepare the force to be studied, based on the type of SACS, and coordinate the input of FAS, TAADS, BOIP, SHN, and TOE files. This office analyzes the SACS output data for accuracy and provides the output to DARCOM, MILPERCEN, and ODCSRADA.

b. HQDA Staff. The other HQDA staff agencies are responsible, within their functional areas, for the accuracy of input data and for analysis of SACS output to ensure accuracy.

c. USAMSSA. This organization provides the data processing support for operation of the SACS.

d. DARCOM. DARCOM is responsible for providing feedback to the DCSOPS concerning the LOGSACS accuracy.

e. MILPERCEN. MILPERCEN provides PERSACS accuracy feedback to the DCSOPS.

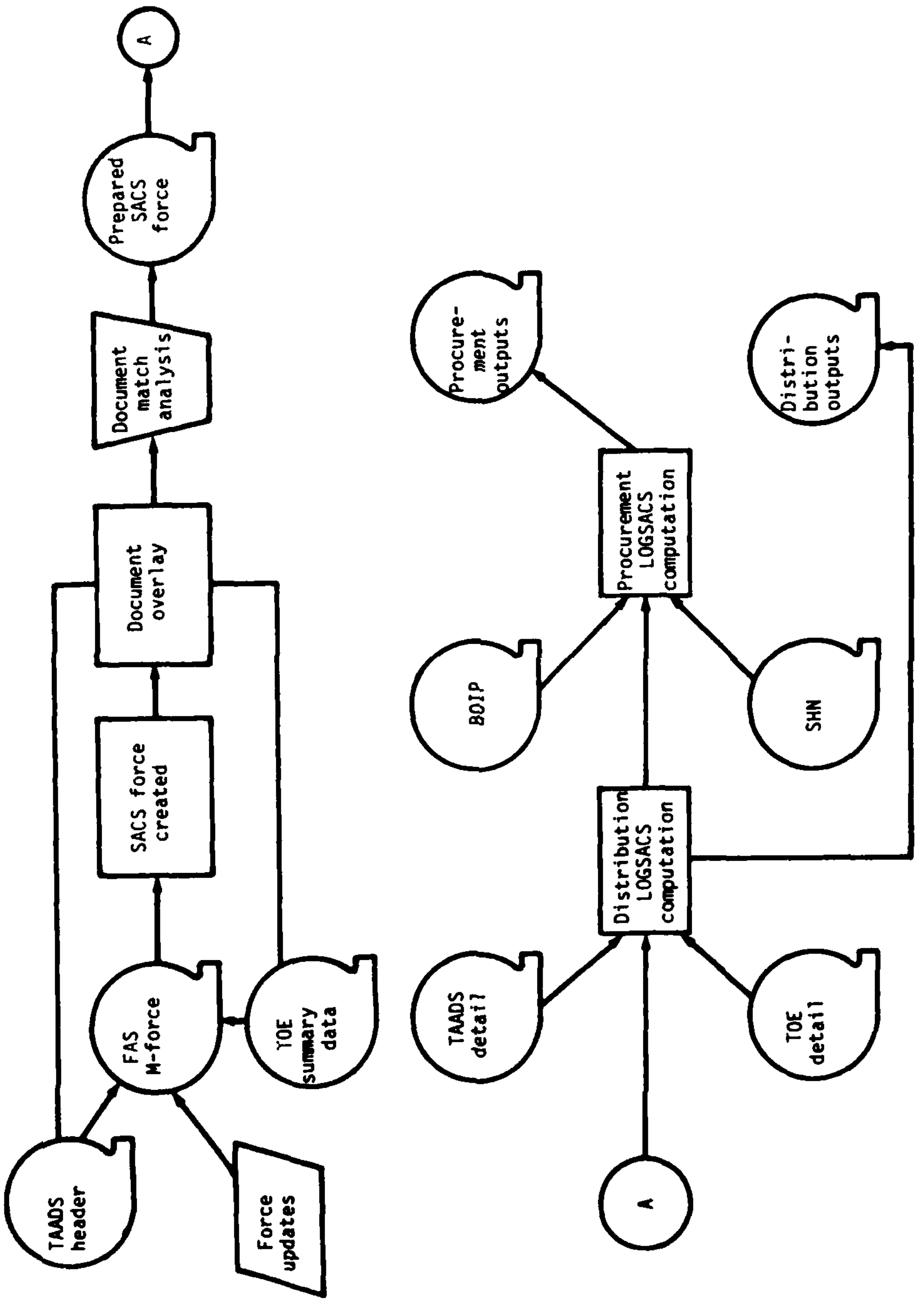


Figure E-3. LOGSACS

Table E-1. SACS Schedule

SACS	Freeze force	Completed
PERSACS	October	October
LOGSACS[a]	Mid-October	Early November
PERSACS	January	January
LOGSACS	Mid-February	Early March
PERSACS	April	April
LOGSACS[b]	Mid-April	Early May
PERSACS	July	July
LOGSACS	Mid-August	Early September

[a] *Supports AMP development.*

[b] Supports budget development.

APPENDIX F

LOGISTIC PLANNING FACTORS METHODOLOGY

F-1. GENERAL. This appendix provides a detailed description of the methodology used in production of up-to-date Army logistic planning factors. While the illustrated example details the production of logistics planning factors for the FY 82 Joint Strategic Capabilities Plan, an identical procedure, with updated data, is used for development of logistic planning factors for the budget and POM year studies.

F-2. DISCUSSION. Since the US Army Logistics Center, with input from the HQDA staff and major support agencies, is continually updating the logistic planning factors, the process, as well as the numbers, are most important.

a. A separate methodology statement which describes the procedures for arriving at the specified pounds per person per day factor is given for each class of supply. One exception is Class III which is expressed in gallons per SRC (UTC) per day.

b. All computations are basd on 100 percent SRC personnel and operational equipment strengths. Individual supply class requirements were independently computed with no consideration for obvious cause and effect interrelationships. For example, the application of WARF rates to Class VII results in a reduction of major end items, but this degradation of equipment is not applied to POL consumption calculation, with the exception of track vehicles for which wartime fuel factors (WAFF) were developed.

c. A consuming item approach was used, when applicable, and represents consumption rates which are theater averages. The application of theater average rates will distort unit requirements at specific levels of organization based on varying usage intensities. Further the maturation process will result in statistical changes, equipment type/density changes and consumption rates modifications.

d. Subsequent computations for planning factors contained within this document are predicated on "Intense Combat." Intense combat implies the range of combat levels of commitment to the least activity, which is expressed as noncommitted. Standardized definitions of "levels of commitment" to include applicable activity percentages (fire support and maneuver) were established by TRADOC letter, ATCD-DJ dated 10 October 1975, subject: Standardization of Terminology. This information has been incorporated into the following process and is reflected in the first three columns of Table F-1. In the fourth column, bounds on levels of commitment were arbitrarily deduced from the preceeding columns. In the fifth column, the median was computed from the established ranges (bounds) in step 2, with the exception of noncommitted which was set at

7 percent based on coordination with DALO-PLF. The sixth column displays the preceeding column normalized to a percentage of moderate level of commitment to compensate for the effect of applying a theater average consumption rate for the first 15-day period, as representative of the most intense unit rates. The seventh column displays the preceeding column normalized to a percentage of heavy level of commitment to compensate for the theater average effect referenced in the previous sentence.

Table F- 1. Levels of Commitment

Level of commitment	Percent committed		Bounds on levels of commitment	Median	Percent of moderate	Percent of new intense rate
	Fire support	Maneuver				
			100			
Heavy	100	60	75	87.5	140	100
Moderate	50	30-60	50	62.5	100	71
Light	50	30	25	37.5	60	43
Reserve			12	18.5	30	21
Noncommitted			0			7

F-3. DETAILED METHODOLOGY. The detailed methodology, with underlying assumptions, for each class of supply is shown below.

a. Class I

(1) Assumptions

(a) Ration policy is two Bs and one C per person per day (DALO-PLF).

(b) The ration supplement sundries pack (RRSP) and female health and comfort items will be included as part of Class I requirement until D+59. Thereafter, AAFES will assume responsibility as the source of supply for these items under Class VI requirements.

(c) Females will compose 10 percent of the theater force.

(2) Methodology

(a) Computation of the Class I factor is based upon the total weight of each ration and the ration policy. The weight of the B ration is 1.264 lbs/meal and the weight of the C ration is 2.083 lbs/meal. Based on the ration policy and the stipulated meal weight, the planning factor for Class I is 4.611 lbs/person/day.

(b) The weight factor for female items is .29 lbs/female/day or a per person theater factor of .03 lbs/person/day. The weight factor for RSSP is .41 lbs/person/day for a combined additional Class I weight of .44 lbs/person/day.

(c) Total Class I weight, until D+59, would be 5.051, i.e. two Bs, one C, RSSP, and female health and comfort items. At D+60 the Class I factor is reduced to 4.611 with the implementation of the AAFES Class VI support. Table F-3 shows the RSSP and female health and comfort (FHC) items, for the period inclusive of D+59, under the primary category 1 C, with supplemental abbreviations for the particular commodity, i.e. 1 C (RSSP) and 1 C (FHC). All ration weight factors and the factor for female health and comfort items were obtained from the US Army Support Activity, Philadephia.

b. Class II

(1) Assumptions

(a) Office furniture (FSCs 71, 72 and 73) will not be required in combat.

(b) Office furniture constitutes 5 percent by weight of supply Class IIB.

(c) Introduction of new protective clothing and equipment items will increase the FM 101-10-1 with Change 1 Class II planning factor by .5 lbs.

(2) Methodology. A basic factor for Class II of 3.26 lbs/person/day was obtained from FM 101-10-1 with Change 1. The DARCOM Report of Supply Categories of Materiel Code Density (2 Dec 80) indicates that 57 percent of the total lines of Class II supplies are in Subclass B. Using this same percentage as representative of the weight distribution of Class II supplies, the weight of Subclass B was reduced by 5 percent (.09 lbs/person/day), in accordance with the assumptions above, to yield a factor of 3.17 lbs/person/day. The 3.17 requirement will be increased .5 lbs, to reflect addition of NBC protective clothing and equipment items for a new Class II factor of 3.67 lbs/person/day. DALO-SMZ-D was the source for the recommended .5 lbs/person/day increase for NBC items.

c. Class III

(1) Assumption. The following daily usage profile equates to an intense level of combat:

(a) Aircraft - 4 hrs.

(b) Wheeled vehicles - 100 kms.

(c) All other equipment - 12 hrs.

(d) Track vehicles - wartime fuel factors (WAFF) rates from the Combat Fuel Consumption Factors (CF^2) Study were used to calculate track vehicle consumption rates, as per guidance from DALO-PLF.

(2) Methodology

(a) The logistics data base (LDB) was used to develop the POL requirement for each unit. All POL requirements are based on the consumption rates provided by SB 710-2 with updated data from the general materiel and petroleum activity (GMPA). Bulk products are limited to MOGAS, JP-4 and diesel fuels. Packaged products include all the various greases, special oils and lubricants. The LDB system multiplies the equipment density by the consumption rates and usage parameters to yield the Class III consumption requirements. Computation of POL consumption rates for aircraft, wheeled vehicles and all other equipment, less track vehicles, was predicated on the usage parameters referenced in para c(1) above. Track rates, in contrast, required a manual development of an artificial "hourly usage factor" compatible with the LDB process, which, in turn, generated the total daily fuel requirements tabulated in the CF^2 Study.

1. To facilitate this process, the consumption rates for each mode of operation, for each type of track vehicle were summed and a percentage of this total was determined for each mode of operation. For example:

M60A1 tank LIN V13101

SB 710-2 Fuel consumption rates		Percent of total
Cross-country (CC)	32.5	.46
Secondary road (SR)	33.0	.47
Idle (I)	5.4	.07
Total	70.9	

2. Next the published WAFF rates were multiplied by 1.4, again, to compensate for the theater average rate effect, define a factor for intense operations, and promote consistency with procedures

applied to Class V and VII computations. The M60 WAFF rate from the CF^2 Study, which is classified CONFIDENTIAL, has been changed for all of the following example computations:

Equip	EXAMPLE WAFF (CF^2)		Factor for intense	JSCP weighted WAFF
M60A1	100.0	X	1.4	140

3. The mode of operation percentages, Step #1, were then multiplied by the weighted JSCP WAFF rate to determine fuel usage in each of the three modes of operation:

CC	140	X	.46	=	64.4 gals
SR	140	X	.47	=	65.8 gals
I	140	X	.07	=	9.8 gals
				Total	140 gals

4. Finally, the hourly consumption rate from SB 710-2 was compared to the new weighted JSCP WAFF consumption rates to artifically construct a factor for hours of operation which could be used to generate the total fuel requirement, to include the effect of the 1.4 multiplier, reflected in the CF^2 Study.

CC	64.4 gals (new WAFF)	÷	32.5 gals (SB 710-2)	=	2.0 hrs
SR	65.8	÷	33.0 gals	=	2.0 hrs
I	9.8	÷	5.4 gals	=	1.8 hrs

(b) The application of the WAFF rates were further expanded to apply to track vehicles (other) not included in the CF^2 Study. In this case, usage profiles for CF^2 studied tracks, which most closely aproximated the usage and vulnerability profile of the additional tracks were applied for POL computation requirements. Further, the CF^2 usage profile for delay was applied to the mathematical process, because it represents the greatest usage of fuel or most intense profile. The additional tracks and their corresponding CF^2 Study track vehicle profiles are shown below:

Additional tracks	CF² WAFF track profiles applied	
A93125 (M551) arm recon abn veh	CFV (M-3)	FY 86
L44644 (M752) lchr GM carrier mtd	M-48	Fy 82
L76750 (M-668A1) loader transp GM LANCE	M-48	FY 82
L43664 bridge arm veh lch	M-109	FY 82
C36120 (M-9) blade, earth moving	M-60	FY 82
E56578 (M728) cbt eng veh F trac	M-60	FY 82
D11681 (GM carr w/equip) carrier GM equip	M-48	FY 82

1. The following ratio process was used to mathematically construct WAFF rates for the additional track vehicles.

Example CF^2 Study

Given M-60 WAFF	100.0 gals			
M-60 usage profile	CC = .6	SR = .9	I = 15.0 hrs	
M-60 GMPA rates	CC = 32.5	SR = 33.0	I = 5.4 gals	
M-728 GMPA rates	CC = 20.6	SR = 33.8	I = 5.3 gals	

Step #1 Compute M-60 consumption (profile X GMPA rates)

CC	.6	(32.5)	=	19.5
SR	.9	(33.0)	=	29.7
I	15	(5.4)	=	81.0
Total				130.2

Step #2 Compute M-728 consumption (profile X GMPA rates)

CC	.6	(20.6)	=	12.36
SR	.9	(33.8)	=	30.42
I	15	(5.3)	=	79.5
Total				122.3

Step #3 Calculate M728 WAFF (does not include 1.4 multiplier)

M728 WAFF = M-60 WAFF (M-728 consump/M-60 consump)

M728 WAFF = 100.0 (122.3/130.2)

M728 WAFF = 93.9

2. Once the new JSCP WAFF rate was determined for the additional tracks, the sequence processes referenced in paragraphs c(2)(a) were repeated.

d. Class IV

(1) Assumptions. See para F-2d.

(2) Methodology. The planning factor of 8.5 lbs/person/day developed by the Engineer Study Center (ESC) and coordinated with Europe and the logistics community is still currently applicable for barrier, fortification and civil engineering support planning per coordination ESC and LOGC, 16 December 1980. This factor is generally used for base development and is consistent with planning factors contained in MJCS 42-79 published by J4 JCS, 31 June 1979. Planners, however, are advised that the 8.5 figure represents an average long term factor, applicable to a developed theater, at D+180. Tailored Class IV factors for specific scenario contingencies must be individually analyzed and developed based on geographical area, duration of the operation, availability of host nation support, degree of austerity to be achieved, etc.

e. Class V

(1) Assumptions. See para F-2d.

(a) The ammunition planning factor is developed based on a consuming items approach. Specifically, each weapon LIN is cross referenced to its applicable consumption rate, by DODAC, to develop a Class V requirement, via the logistics data base (LDB) automated system. The LDB multiplies the weapon density of each ammunition consumer, within an SRC, by the designated ammunition rate to determine the amount of ammunition consumed. The result from this process is in turn multiplied by 1.4 to establish the intense rate requirement. The following DA distribution (D) rates were used to produce the FY 82 JSCP Class V requirements:

1. D-82 rates for Europe and Mideast Theaters (D-day to D+15 rate).

2. D-77 rates for Pacific and Arctic (D-day to D+15 rate).

(b) Bulk (conventional) ammunition, such as hand grenades, demolitions and mines were computed on a per capita basis. Consumption rates for these items are expressed in terms of quantity of items per 1000 persons per day. These established rates were multiplied by the item weights, summed and then divided by 1000 to yield a pounds per person per day rate. The resulting rate is multiplied by the unit strength to derive a unit bulk ammunition planning factor. The bulk ammunition planning factor and the weight of ammunition consumed by weapons are summed to yield the total Class V planning factor for each SRC.

f. Class VI

(1) Assumptions. AAFES will not have a viable distribution system in the theater for Class VI support until D+60, as per AAFES Contingency Plan 77-1.

(2) Methodology

(a) The Class VI planning factors after D+60 are as follows, based on inventory mixes specified in the referenced AAFES Contingency Plan.

Climatic zone	Factors
Tropics (PAC/Mideast)	5.59 lbs/person/day
Temperate (Europe)	3.21 lbs/person/day
Arctic	3.52 lbs/person/day

(b) All Class VI factors pertain to a stock assortment relative to emergency troop deployment and represent demand experience for items with high troop acceptance. Subsequent mechandising plans will be developed and/or ammended to provide for increase or decrease in inventories necessitated by the deployment, sales and contingency limitations.

(c) AFFES Emergency Operation Procedures (EOP) divide the various categories of merchandise into nine separate departments which can be individually and/or collectively controlled to best meet the needs of a particular contingency.

Table F-2. Classes of Supply

Departments	Lbs/person/day by climate		
	Tropic	Temperate	Arctic
Dept 1, Tobacco	.139	.139	.139
Dept 2, Food/drink	4.75	2.375	2.371
Dept 3, Pers hygiene	.168	.168	.168
Dept 4, Mil cloth	.097	.097	.195
Dept 5, Jewelry (watch & wallets)	.005	.004	.004
Dept 6, Stationery	.083	.081	.081
Dept 7, Civil clothing	.096	.096	.096
Dept 8, Gen supplies (polish, batteries, etc)	.219	.219	.438
Dept 9, Cameras, radio, film, etc	.028	.028	.028
Total	5.585	3.207	3.520

(d) It can be noted, for example, the items traditionally found in the RSSP and those designated as female health and comfort items are continued within the designated inventories for departments 1 through 3. In particular, the minimum essential planning factor in pounds per person per day, for austere operations and/or forward deployed units could be satisfied with the application of the following factors:

Tropic	5.057	lbs/person/day
Temperate	2.683	lbs/person/day
Arctic	2.678	lbs/person/day

(e) Further, in all cases, the commanders have the prerogative to influence the AAFES operations as they deem appropriate, based on the tactical situation.

g. Class VII

(1) Assumptions. See para F-2d.

(2) Methodology. The logistics data base (LDB) is used to develop the Class VII factor. The FY 82-86 POM LIN-SSN Sequence Cross Reference Document, published by the US Army Research, Development and Acquisition Information Systems Agency (RDAISA), provides the wartime replacement factor (WARF) rates used for the Class VII computations. The WARF rate is expressed in 15-day periods but represents a 30-day average factor. The first two periods are summed then divided by 60 to derive a WARF for one day. The one-day WARF is then multiplied by the density of items in each unit and the weight of each item to yield a total pounds lost per unit per day. If no 15-day rate exists, the system automatically

defaults to and applies the historic WARF rate which is also contained in the same RDAISA document. Item weights are obtained from the COMPASS or AMDF files, in that order. The result from this process is multiplied by 1.4 to establish the planning factor for heavy commitment.

h. Class VIII. The Logistics Division, Office of the Surgeon General, provided the Class VIII planning factor of .35 lbs/person/day.

i. Class IX

(1) Assumptions. See para F-2d.

(2) Methodology. The planning factor for Class IX is 3.45 lbs/person/day which is based on the findings and conclusions of the 1980 Combat to Support Balanced Study (CSBS). As in Class V and VII, the 3.45 value represents an overall theater average, or moderate rate. These values represent the intensity of combat when repair part requirements are generated and not necessarily when they are used. Specifically, a period of intense combat will generate higher requirements for repairs, but the actual determination of what is required, supply requisitions and actual repairs may occur in a period of lighter combat activity. The rates for Class IX are as follows:

Intense	4.83
Moderate	3.45
Light	2.07
Reserve	1.04
Noncommitted	.34

Table F-3. Logistic Planning Factors
(page 1 of 3 pages)

Basis: Personnel strength in theater of operations for 1 day
Category: Consumption by supply class (lbs/person/day)

Consumption supply class	Combat intensities					Theater adjustment multi			
	1 (heavy)	2 (moderate)	3 (light)	4 (reserve)	5 (noncommitted)	Eur	ME	Pac	Arctic
1C	2.08	2.08	2.08	2.08	2.08	1.0	1.0	1.0	1.0
1C-RSSP	.41	.41	.41	.41	.41	1.0	1.0	1.0	1.20
1C-FHC	.03	.03	.03	.03	.03	1.0	1.0	1.0	1.0
1S	2.53	2.53	2.53	2.53	2.53	1.0	1.0	1.0	1.20
2A	.17	.17	.17	.17	.17	1.0	1.0	1.0	1.0
2B	1.78	1.78	1.78	1.78	1.78	1.0	1.0	1.0	1.0
2E	.23	.23	.23	.23	.23	1.0	1.0	1.0	1.0
2F	.32	.32	.32	.32	.32	1.0	1.0	1.0	1.0
2G	.20	.20	.20	.20	.20	1.0	1.0	1.0	1.0
2H	.08	.08	.08	.08	.08	1.0	1.0	1.0	1.0
2K	.02	.02	.02	.02	.02	1.0	1.0	1.0	1.0
2L	.01	.01	.01	.01	.01	1.0	1.0	1.0	1.0

Table F-3. Logistic Planning Factors
(page 2 of 3 pages)

Basis: Personnel strength in theater of operations for 1 day
Category: Consumption by supply class (lbs/person/day)

Consumption supply class	Combat intensities					Theater adjustment multi			
	1 (heavy)	2 (moderate)	3 (light)	4 (reserve)	5 (noncommitted)	Eur	ME	Pac	Arctic
2M	.03	.03	.03	.03	.03	1.0	1.0	1.0	1.0
20	.01	.01	.01	.01	.01	1.0	1.0	1.0	1.0
2P	.01	.01	.01	.01	.01	1.0	1.0	1.0	1.0
2Q	.04	.04	.04	.04	.04	1.0	1.0	1.0	1.0
2T	.11	.11	.11	.11	.11	1.0	1.0	1.0	1.0
2W	.15	.15	.15	.15	.15	1.0	1.0	1.0	1.0
2Z	.51	.51	.51	.51	.51	1.0	1.0	1.0	1.0
*3A (JP4)	3.02	2.14	1.30	.63	.21	1.0	1.0	.83	.83
*3W (MOGAS)	3.84	2.73	1.65	.81	.27	1.0	1.0	.95	1.01
*3W (DFM)	4.32	3.07	1.86	.907	.302	1.0	1.0	.90	.84
3 Packaged	1.26	1.24	1.22	1.21	1.20	1.0	1.0 1.	1.0	1.0
4	8.5	8.5	8.5	8.5	8.5	1.0	1.0	1.0	1.0

*Classes 3A and 3W are reported in gallons/person/day

Table F-3. Logistic Planning Factors
(page 3 of 3 pages)

Basis: Personnel strength in theater of operations for 1 day
Category: Consumption by supply class (lbs/person/day)

Consumption supply class	Combat intensities					Theater adjustment multi			
	1 (heavy)	2 (moderate)	3 (light)	4 (reserve)	5 (noncommitted)	Eur	ME	Pac	Arctic
5A	1.25	.89	.54	.26	.00	1.0	1.0	5.24	5.24
5W	90.18	64.03	38.78	18.94	.00	1.0	1.0	1.24	1.24
6	3.21	3.21	3.21	3.21	3.21	1.0	1.74	1.74	1.10
7A	.46	.33	.20	.10	.03	1.0	1.0	1.0	1.0
7B	3.41	2.42	1.47	.72	.24	1.0	1.0	1.0	1.0
7D	.002	.001	.001	.000	.0000	1.0	1.0	1.0	1.0
7G	.46	.33	.20	.10	.03	1.0	1.0	1.0	1.0
7K	16.17	11.48	6.95	3.40	1.13	1.0	1.0	1.0	1.0
7L	1.39	.99	.59	.29	.10	1.0	1.0	1.0	1.0
7M	1.18	.84	.51	.25	.08	1.0	1.0	1.0	1.0
7N	.00	.00	.00	.00	.00	1.0	1.0	1.0	1.0
8	.35	.35	.35	.35	.35	1.0	1.0	1.0	1.0
9	4.83	3.45	2.07	1.04	.34	1.0	1.0	1.0	1.0

APPENDIX G

SECONDARY ITEM WAR RESERVE REQUIREMENTS

G-1. INTRODUCTION

a. Concept. Secondary items include defense-managed items not specifically designated as principal items, such as spares and repair parts, and expendable/consumable items. Included are both appropriation funded and stock funded items. The wartime requirement for secondary items, like that for major items and ammunition, is based upon specific guidance as to scenario, forces involved, and time of support required. A simplified illustration of the concept is shown in Figure G-1. There exists a normal peacetime distribution of units in CONUS and overseas, and this force structure requires a relatively stable level of secondary item support. In time of war, the number of units increases and the distribution of those units changes. As a result, the requirement for secondary items increases. Since there is a finite amount of time required to increase and accelerate the production of these items, it becomes necessary to have in reserve in peacetime sufficient stocks of these items to sustain the wartime forces until the supply system can catch up. These stocks are referred to as war reserve stocks, and the estimation of what they should contain is an important part of the Army requirements determination process.

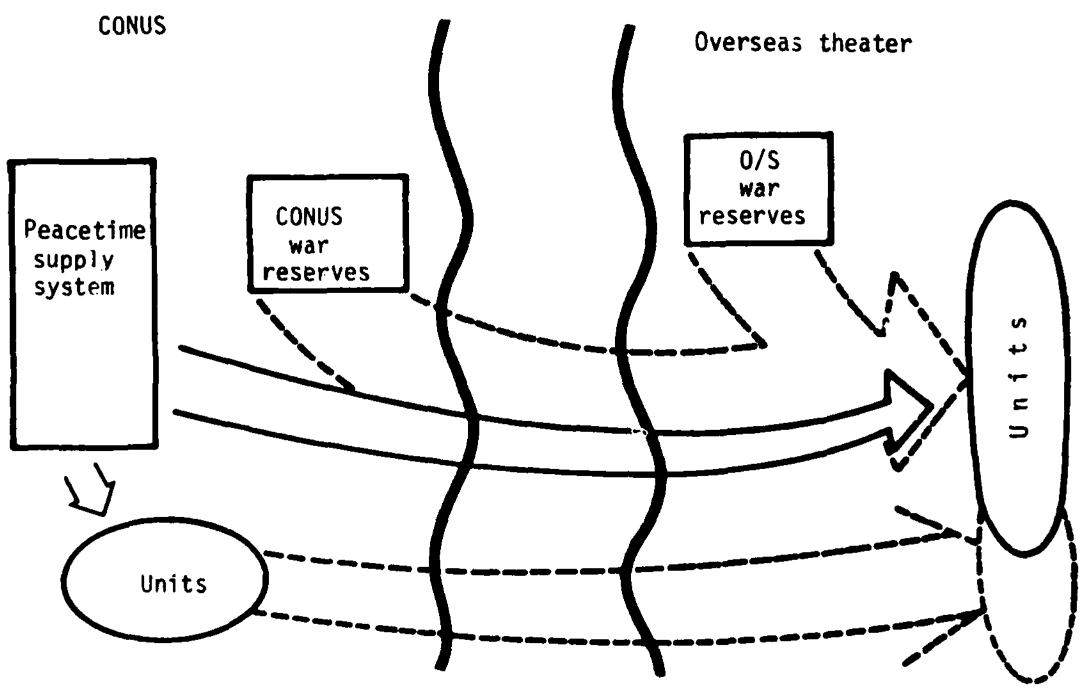


Figure G-1. Concept of Wartime Requirement for Secondary Items

b. Stratification. The total wartime requirement is referred to as the war materiel requirement (WMR) and is made up of a:

(1) Peacetime Asset Offset. Those stocks which are presently on hand, or will be on hand at the time specified, which can be used to meet the wartime requirement.

(2) War Materiel Procurement Capability. Those stocks which can be delivered from post-D-day production in time to meet the wartime requirement.

(3) War Reserve Materiel Requirement (WRMR). Those additional stocks required to be on hand on D-day of the total wartime requirement is to be met. This requirement is further divided into:

(a) Prepositioned War Reserve Materiel Requirement (PWRMR). Those stocks which are to be positioned at or near the point of planned use or issue to the user prior to hostilities. The purpose of prepositioning is to reduce reaction time and assure timely support of a force until replenishment can be accomplished. These stocks are positioned both in CONUS and overseas.

(b) Other War Reserve Materiel Requirement (OWRMR). The remainder of the war reserve materiel requirement. Figure G-2 illustrates this stratification of the war materiel requirement.

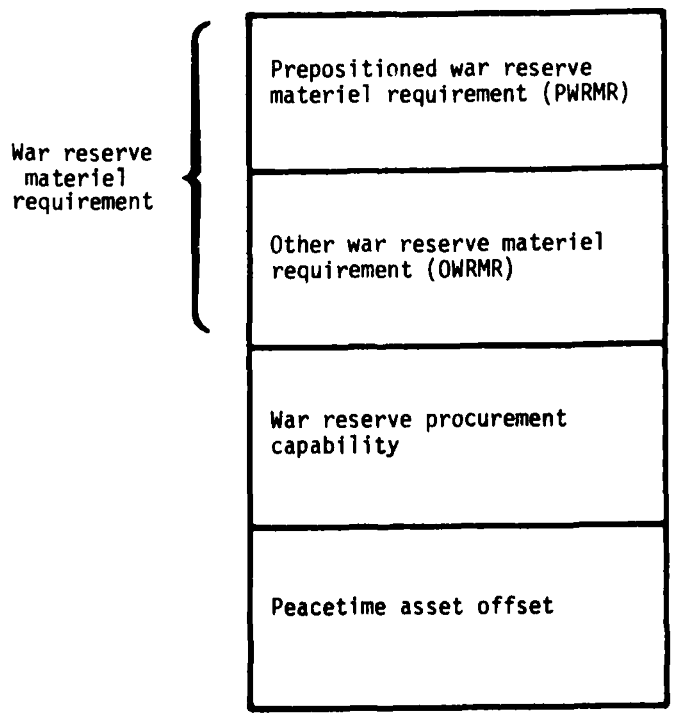


Figure G-2. War Materiel Requirement

G-2. PRESENT METHOD OF COMPUTING SECONDARY ITEM WAR RESERVE REQUIREMENTS (CLASSES I, II, III, IV, VIII, IX)

a. General. For each class of supply, there is a methodology for determining the wartime requirement for that class of supply. In general terms,

Requirement = Density supported x usage rate x period of support

Within each supply class, the items for which wartime requirements are to be computed are limited to those which are considered to be combat essential or for which there exists some unique reason why stockage is required. Detailed guidance on stockage criteria is found in AR 11-11 and AR 710-1. The list of end items and items of supply other than supplies and repair parts is published in SB 700-40, War Reserve Stockage List (WARSL). The WARSL is used to determine the end items for which repair parts are to be stocked and the list of items for which wartime replacement factors (WARF) are to be computed.

b. Personnel and Equipment Densities. DESCOM extracts personnel and equipment density data and deployment information from the LOGSACS and provides it to DARCOM materiel readiness commands and service item control centers (SICC) for their use in computing war reserve requirements. For each end item of equipment listed in these extracts, the MRC/SICC maintains a cross-reference file containing a list of supporting secondary items for which war reserve quantities should be computed.

c. Computational Methodology

(1) Class I. From the LOGSACS, DESCOM extracts POM force personnel deployment strength in the theater over a predetermined period of time. This information is in turn provided to the US Army Support Activity, Philadelphia (USASAP) which computes ration requirements based on one ration per indivdual per day. For combat rations, the mix is 40 percent "C" and 60 percent "B." A sample requirement computation for B rations is shown in Figure G-3. The requirements are provided to HQDA for management, to the MACOM for planning/status reporting, and to DARCOM for distribution planning and passing of requirements to the Defense Logistics Agency (DLA) which is responsible for procurement, storage, and distribution.

(2) Class II. From the LOGSACS, DESCOM extracts POM force personnel strengths and equipment deployment densities in the theater over a predetermined period of time. The WARSL is then applied to determine the equipment to be supported. These in-theater densities are passed to USASAP for clothing and textile requirements; DARCOM materiel readiness commands (filters, nets, etc.); General Materiel Petroleum Activity (GMPA) (paper, tools, etc.), and the US Army Medical Materiel Agency

(medical items) for the computation of Class II requirements. These requirements are based on loss/usage/replacement factors provided by ODCSOPS, TRADOC, or the MRCs themselves. Computed requirements are provided to HQDA for budget preparation, the major command (MACOM) for planning, requisitioning, status reporting, and to DARCOM for procurement and storage.

Strength of force		X	ration mix	=	spt for 1 day	
D-day	(400,000)	X	.60	=	240,000	D-day
D+1	(410,000)	X	.60	=	246,000	D+1
D+2	(410,000)	X	.60	=	246,000	D+2
D+3	(410,000)	X	.60	=	246,000	D+3
D+70	(1,000,000)	X	.60	=	600,000	D+70
	Total B rations for 70 days				75,342,970	

Ration Mix 40% C / 60% B

Figure G-3. Sample B Rations Computation

(3) <u>Class III</u>

(a) From the LOGSACS, DESCOM extracts POM force and equipment densities in the theater over a predetermined period of time. These densities are in turn provided to GMPA which computes fuel requirements based on fuel consumption in various modes of operation as provided by DARCOM MRCs and a combat usage profile which is the number of hours/miles equipment will be used per day. For example, in Europe, it is expected that aircraft will operate 4 hours per day, wheeled vehicles 100 km/day, stationary equipment 12 hrs/day, and tracked vehicles a variable time based on the operational mode of each vehicle. When computed, the requirements are then provided to HQDA for management and budget preparation and to the MACOM for validation and comments before being forwarded to Defense Fuel Supply Center (DRSC), for procurement, management, and storage worldwide.

(b) Package. From the LOGSACS, DESCOM extracts POM force and equipment densitites in the theater over a predetermined period of time. These densities are then provided to GMPA which computes wartime requirements based upon the adjustment of DLA's peacetime usage to reflect expected wartime usage. These requirements are provided to HQDA for budget preparation, to the MACOM for planning, management, and requisition, and to DARCOM for procurement and manangement.

(4) Class IV. War reserve requirements for Class IV items are provided by the theater and are based on the theater barrier plan. These requirements are passed to HQDA for budget preparation and to DARCOM for procurement, budget preparation, and management.

(5) Class VIII

(a) Medical Assemblages. Medical units, rather than being authorized hundreds of line items on their TOEs, are authorized a basic medical assemblage which contains the medical and related items necessary for the accomplishment of the unit mission. With the exception of investment items of equipment, the consumable items within these assemblages constitute a basic load until resupply can be effected. The Army's major medical assemblages which constitute resupply packages take the form of the medical/optical resupply sets and are the medical items in the WARSL. Investment items now being funded with OPA are being reviewed for addition to the WARSL.

(b) Computation Methodology. The OTSG provides USAMMA with strength information for each overseas area. Based on the strength figures and the days of supply cited in AR 11-11, a requirement is developed using the medical/optical resupply sets.

(c) Responsibility of MACOMs. The requirements are provided to the major commands either as an assemblage requirement or in components dependent on their data processing (ADP) capability. AR 11-11 authorizes the commands to pass requirements back to USAMMA for dated and deteriorating type items which are beyond their peacetime rotational capabilities. These requirements are incorporated into the Army PWRMR managed by USAMMA. The commands also have requirements for the mobilization programs outlined in AR 40-61. These include the programs for nuclear casualties and defense against biological and chemical agents.

(d) Entry Categories of the WMR. As indicated in Figure G-4, there are eight major categories in the WMR.

1. Reserve, National Guard, and Selected Active Forces. This represents initial allowance shortages for these types of units.

2. Operational Projects. This category is an M-day requirement. Each MACOM must develop materiel requirements to support JCS/DA designated and approved operational projects.

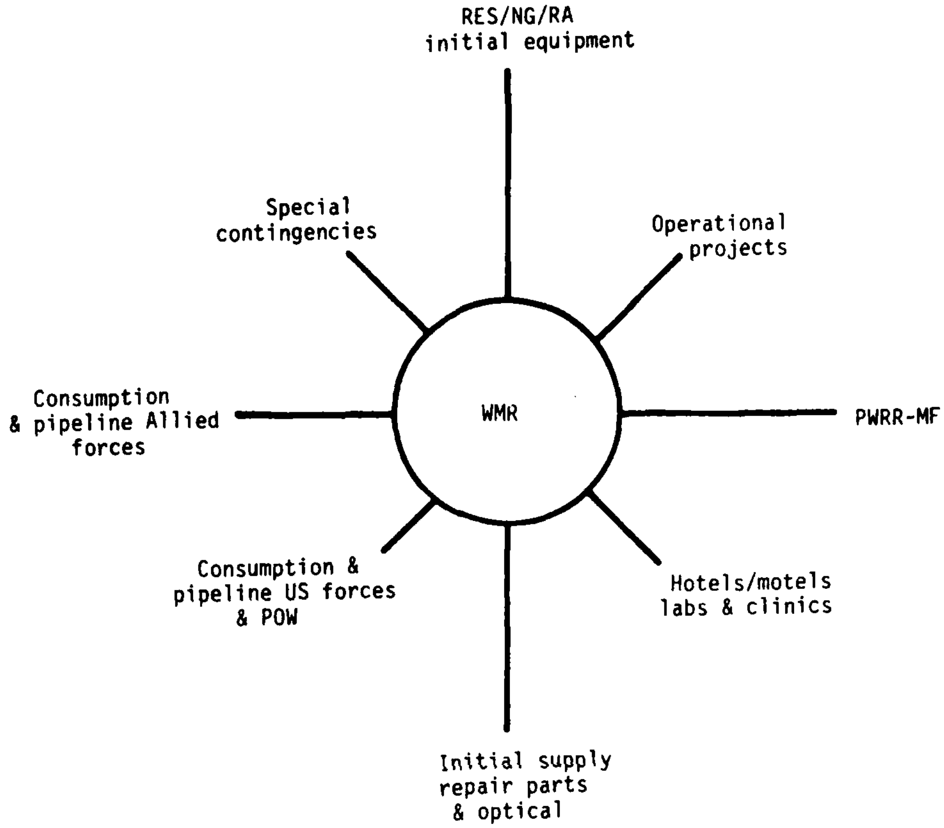


Figure G-4. WMR Categories

3. PWRMR-MF. This category is an M-day requirement. This is materiel required for expansion of CONUS medical facilities to support mobilization and overseas combat casualty evacuees. Major medical equipment sets are used as a basis of computation.

4. Hotels/Motels, Laboratories, and Clinics. This program calls for activation of specific medical units using hotels/motels for facilities. The initial materiel requirements are based on the appropriate medical assemblage and are included in the OWRMR submission to DPSC.

5. Repair Parts and Optical Items. This category is for an initial 30-day supply of repair parts and an initial supply of optical items to support Army and Air Force Reserve/National Guard units mobilized.

6. Consumption and Pipeline. All previously mentioned categories have been completed based upon specific basis of issue (BOI) documents. The consumption categories are based on the full range of medical items and their consumption rates during each month. Through the

troop deployment scenario provided USAMMA by the DARCOM guidance letter, the number of troops to be supported at peacetime, mobilization support, and active war rates are developed. These strengths (in thousands) are then multiplied by the appropriate rate for each item and entered into the WMR computation. USAMMA develops the peacetime rates using current Army demands (provided by DPSC) per 1,000 troops for 30 days. Where available, active war rates are based on high demands experienced in Vietnam during the total 1968 timeframe. For new items, a factor has been developed for each type based on a like type item experience gained in Vietnam. This factor is applied to the current peacetime rate to develop an active war rate for the item. The mobilization support rate was developed based on consumption because of increased beds in CONUS and two 1,000-bed general hospitals in Japan during the Vietnam conflict.

7. Special Contingencies. These are optical and medical resupply sets to support a non-Asian force of strength specified by DA.

(e) Conclusion. The total for each item for all the above categories represents the WMR. As already discussed, the peacetime assets are deducted from the total to develop the WRMR. From this remaining figure, the PWRMR (Army owned and Army managed) is removed and the net result is the OWRMR entry which is DLA managed.

G-3. IMPROVED STANDARD SYSTEM FOR COMPUTING SECONDARY ITEM WAR RESERVE REQUIREMENTS (SUPPLY CLASSES I, II, III, IV, IX)

a. General. As a result of a thorough and detailed review of the Army secondary item war reserve requirements determination process conducted by the Logistics Evaluation Agency, an improved computational system has been proposed and is being developed at this time. This improved system will meet the requirements of DODI 4140.47, "Secondary Item War Reserve Requirements Development" (July 11, 1979) and will provide standard modules for computing war reserve requirements in each of the following supply classes:

Class I - Subsistence
Class IIF - Clothing and individual equipment
Class II (other) - Tools, test sets, and kits
Class III - Bulk and packaged POL
Class IV - Construction and fortification materials
Class IX - Repair parts

Class VIII (medical) requirements will continue to be computed by USAMMA as described in paragraph G-2.

b. Personnel and Equipment Densities. With the exception of Class II (other), the data source for personnel and equipment densities will be extracts from TAEDP provided by DESCOM. Class II (other) requirements will be computed manually using the best data available. Responsibilities for supply classes are shown in Figure G-5.

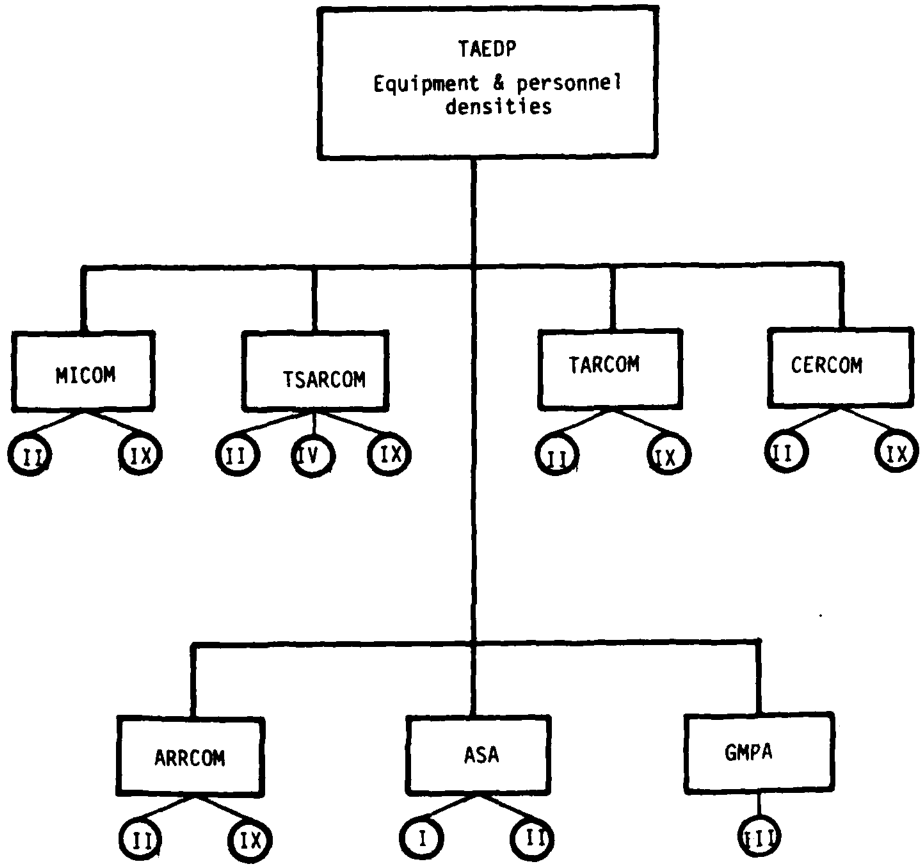


Figure G-5. Responsibility for Classes of Supply

c. Computational Methodology

(1) General. The DODI directed a number of specific features which made it necessary to completely redesign the present computational methodology. The most significant of these is the requirement to stratify the war reserve requirement into two parts, wholesale and retail. In addition, the DODI specifically requires that the requirements will be based on specific troop strengths, their deployments, authorized equipments and densities. Outputs are to be provided in 30-day increments, and the Army is allowed to select as its requirement the sum of the peak wholesale and retail levels computed over the entire wartime support period. The following paragraphs describe the standard computational modules for each supply class.

(2) Class I. (See Table G-1 and Figure G-6.)

(a) Requirements module will automate existing computations and stratify requirements in accordance with DODI 4140.47.

(b) For each 30-day increment, model will compute requirements as follows:

Wholesale requirement = manpower (Σ deployed + Σ deploying force) x consumption factors ("B" rations, individual rations) x 30 days.

Retail requirement = manpower (Σ deploying forces) x consumption factors as above x (order/ship time + safety level + resupply delay time).

Table G-1. Class I - Subsistence

Required data element	Data source
Manpower Density in 30-day increments (Deployed and Deploying)	TAEDP
Casualties (KIA, MIA, WIA)	Guidance
Requirements for hospital rations	Guidance
Consumption rates	Applicable supply bulletins
Cost	AMDF/Federal Supply Catalog
OST/Safety Level/RDT for Class I	Guidance

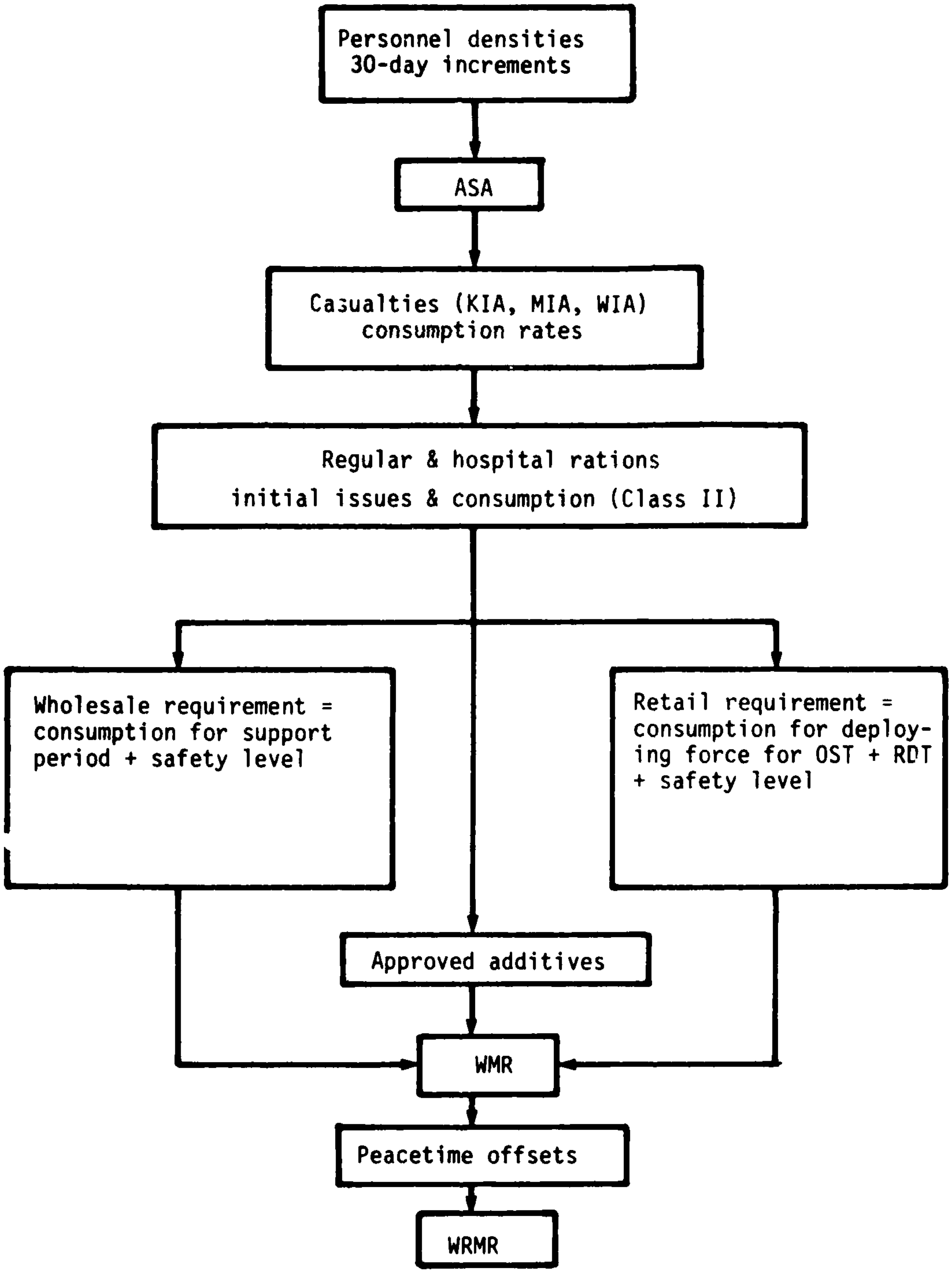


Figure G-6. Class I - Subsistence, Class II - Individual Equipment

(3) <u>Class II F</u>. (See Table G-2 and Figure G-6.)

(a) Requirements model will automate existing computations and stratify requirements in accordance with DODI 4140.47.

(b) For each 30-day increment, model will compute requirement as follows:

Wholesale requirement = manpower (Σ deployed + Σ deploying forces) x replacement rates x 30 days.

Retail requirement = manpower (Σ deploying forces) x replacement rates x (OST + S.L. & RDT).

(c) Initial issues = manpower (Σ deploying forces) x initial issue factors (reserves, NG, active).

Table G-2. Class IIF - Clothing and Individual Equipment

Required data element	Data source
Manpower density in 30-day increments (Deployed and Deploying)	TAEDP
Initial issue factors	Guidance
Replacement rates	Applicable supply bulletins
Chemical clothing reqmts/usage rates	Guidance
Cost	AMDF/federal supply catalog
OST/safety level/RDT for Class II F	Guidance

(4) Class II (other). Because of the diversified nature of these items and the fact that failure factors/consumption rates are not known for all items, these calculations will be done manually by the respective MRC. Table G-3 illustrates the commodity manager and the number of items it manages. The subclasses and their definitions are listed below:

(a) 2A - Parachutes and accessories, survivial kits.

(b) 2B - Tool kits, fire extinguishers, sand bags, shop equipment, hand tools.

(c) 2E - Stencil equipment, insect repellant.

(d) 2G - Electronic kits, accessory kits for radios, antennas battery chargers, cable assembly.

(e) 2H - Ammeters, signal generators.

(f) 2L - Accessory kits for missiles.

(g) 2M - Fire direction set.

(h) 2Q - Water cans, electric tool kits.

(i) 2W - Backhoe buckets, blasting equipment.

(j) 2Z - Chemical detectors, breathing apparatus.

(5) Class III. (See Table G-4 and Figure G-7.)

(a) Requirements model will automate existing computations and stratify requirements in accordance with DODI 4140.47.

(b) For each 30-day increment, model will compute requirements as follows:

Wholesale requirement = equipment density (Σ deployed + Σ deploying) x utilization rate x consumption factor x 30 days

Retail requirement = equipment density (Σ deploying) x utilization rate x consumption rate x (OST + S.L. + RDT)

Table G-3. Class II (other) - Tools, Test Sets, and Kits

Commodity mgr	Subclass	No. of item	Commodity mgr	Subclass	No. of items
TSARCOM	2A	130	GMPA	2B	117
	2B	25		2E	40
	2H	1		2Q	15
	2M	10		2W	8
	2Q	1			
TARCOM	2W	11	MICOM	2L	18
ARRCOM	2B	69	CERCOM	2G	224
	2E	47		2H	20
	2G	10		2M	1
	2H	10		2W	1
	2M	17			
	2W	5			
	2Z	17			

Total items managed - 797

Table G-4. Class III - Packaged and Bulk POL

Required data element	Data source
Equipment density in 30-day increments (Deployed and Deploying)	TAEDP
Equipment Utilization Rates (i.e., Wartime Program Data)	Guidance
Consumption factors	SB 710-2
Cost	AMDF
OST/safety level/RDT for Class III	Guidance

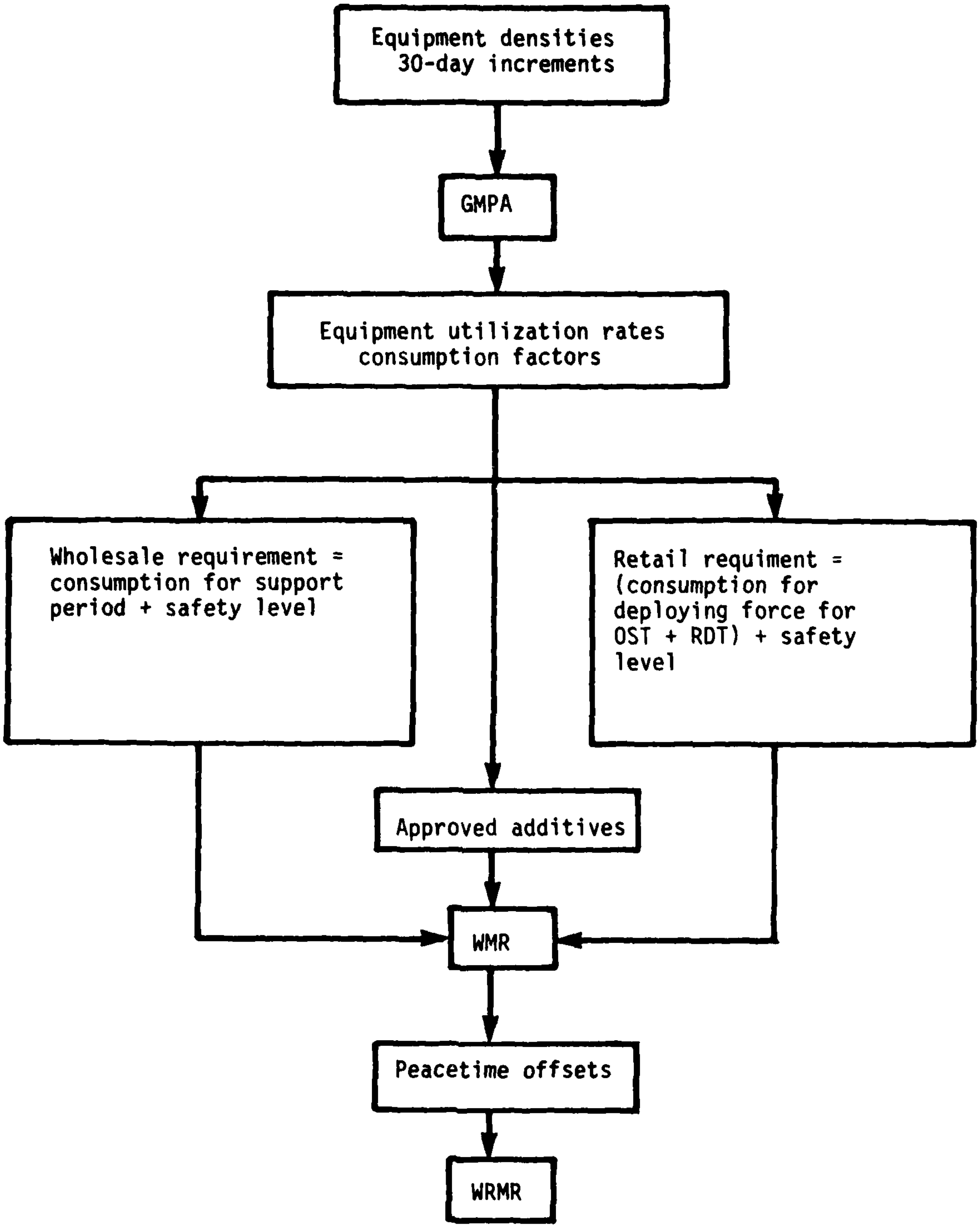


Figure G-7. Class III - Packaged and Bulk POL

(6) Class IV

(a) Currently, Class IV requirements are provided by the theater commander.

(b) Requirements should be automated for predetermined configurations; for example, the total Class IV requirement for common projects such as POW camps, specific type barriers or bridges would be predetermined and entered into the war reserve requirement based on the number of each type project needed by the theater commander.

(7) Class IX. (See Table G-5 and Figure G-8.) Class IX computation is the most difficult when compared to other classes of supply. Class IX consumables and repairables each require their own computational procedure. A weapon system approach will compute the total Class IX requirement for each WARSL end item by NSN. (See Table G-5 for data elements/sources.) After calibrations have been made for all end items, the requirements will be summed by NSN for war reserve reports. Failure factors have been chosen for use in the standard system (in lieu of average monthly demands) for the following reasons:

(a) Overall requirements computation is simplified.

(b) For repairable items, wholesale demands usually represent the washout quantities and are not an indicator of total removals/replacements.

(c) DLA demand data will not have to be processed prior to requirements computation.

(d) A standard automated system is currently being developed to update and maintain failure factors.

Table G-5. Class IX - Repair Parts

Required data element	Data sources
Equipment density in 30-day increments (deployed and deploying)	TAEDP
Identify for each NSN: (1) WARSL support (2) Essential (3) Consumable (4) Reparable	NSNMDR/PMR
Maintenance levels (task distribution)	PMR/NSNMDR
Replacement factors & washout rates	PMR/NSNMDR
Repair cycle times	PMR
Environmental factors	PMR/NSNMDR
Intensity factor	FF modified as per guidance
Usage rate (end item)	Program change factor (e.g., $\frac{\text{Wartime use}}{\text{Peacetime use}}$)
Maintenance level code	NSNMDR/PMR
Combat Damage	SPARC, et. al.
OST, safety levels, RDT (Wholesale and retail)	Guidance
Failure factor	PMR/NSNMDR

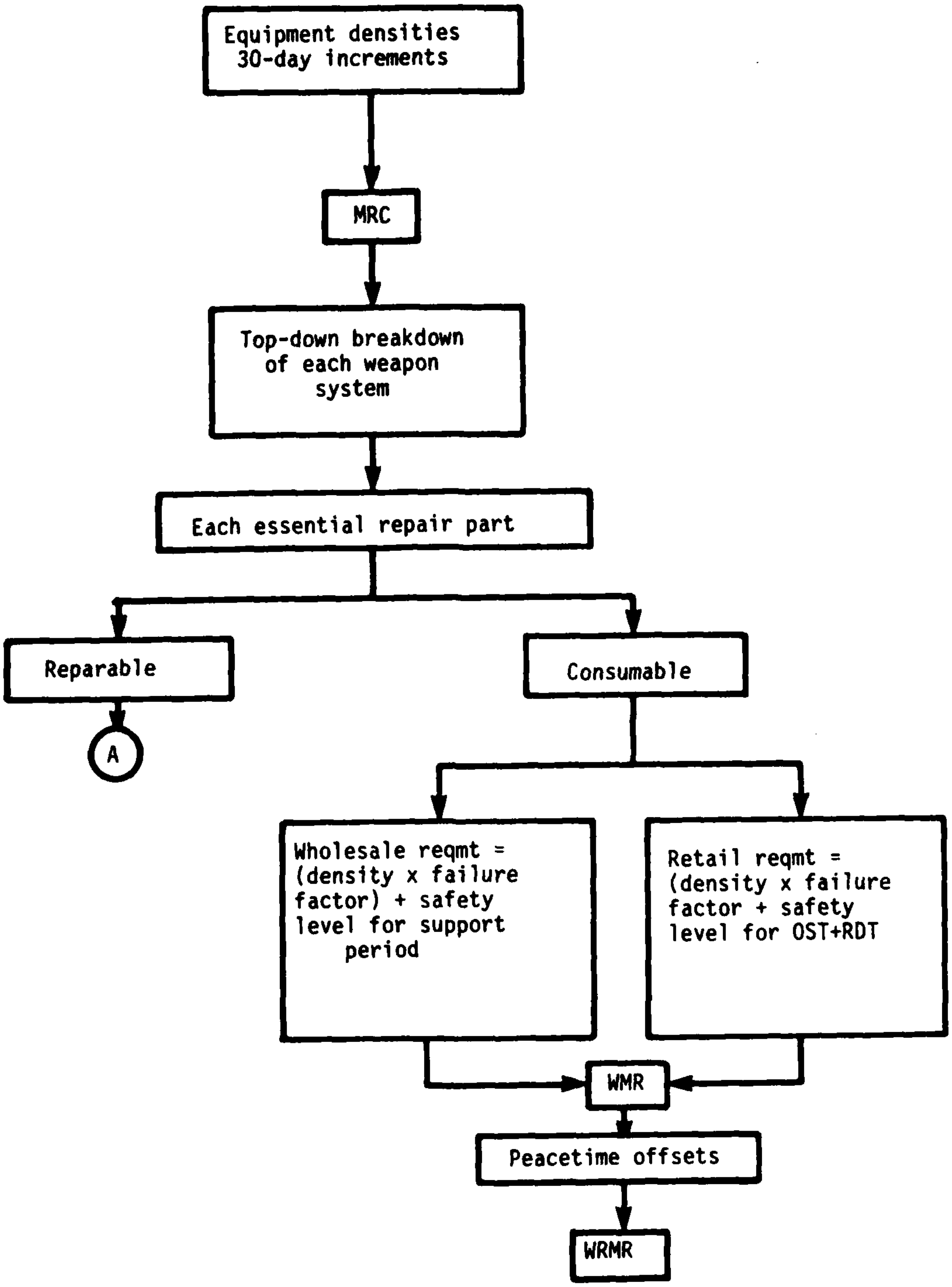


Figure G-8. Class IX - Repair Parts
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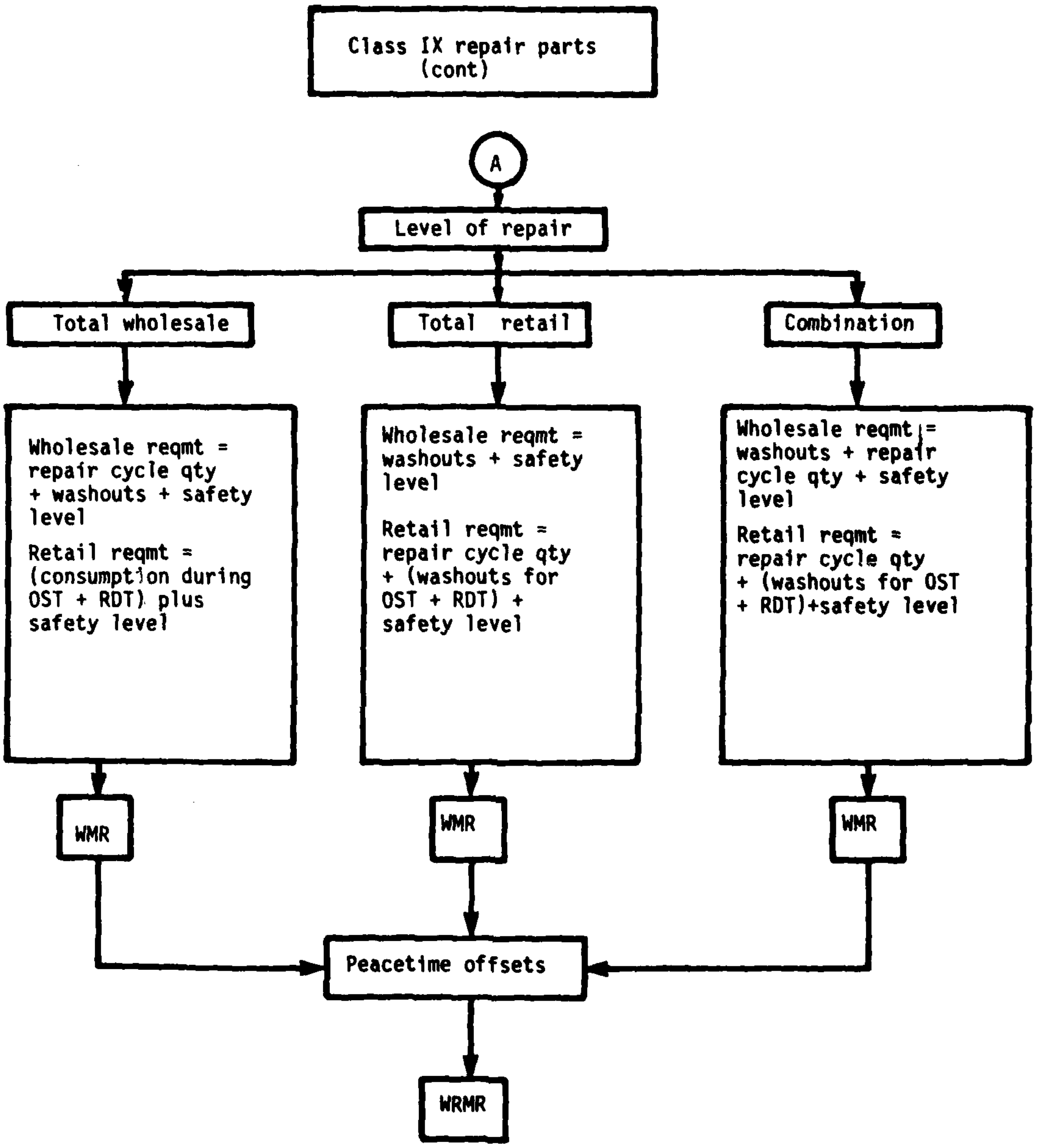

Figure G-8. Class IX - Repair Parts
(page 2 of 2 pages)

GLOSSARY OF TERMS

1. ABBREVIATIONS, ACRONYMS, AND SHORT TERMS

AAFES	Army and Air Force Exchange System
AAO	Army Acquisition Objective
ACP	Army Capabilities Plan
ACSI	Assistant Chief of Staff for Intelligence
ADCON	administrative control code
ADP	automatic data processing
AFCENT	Armed Forces Central Europe
AFPDA	Army Force Planning Data and Assumptions (study)
AF/XOEX	US Air Force Deputy Chief of Staff for Operations, Plans and Readiness; Plans, Programs and Policy Division (file symbol)
ALMC	Army Logistic Management Center
ALO	authorized level of organization
AMDF	automated master data file
AMMO/WARF	Wartime Requirements for Ammunition and Materiel (study)
AMP	Army Materiel Plan
AMSAA	Army Materiel Systems Analysis Activity
APC	armored personnel carrier
AR	Army Regulation
ARRCOM	US Army Armament Materiel Readiness Command
ARSTAF	Army Staff
AUTS	Automated Update Transaction System
BOIP	basis of issue plan

CAA	US Army Concepts Analysis Agency
CARSS	combat arms regimental system
CAS	personnel casualties
CE	communications/electronics
CERCOM	Communications/Electronics Materiel Readiness Command
CF^2	Combat Fuel Consumption Factors Study
CMIA	captured/missing in action
COA	Comptroller of the Army
COEA	cost and operational effectiveness analysis
COMMZ	communications zone
COMPO	component code
CONUS	continental United States
CSBS	Combat to Support Balance Study
CSS	combat service support
DA	Department of the Army
DAAG	Adjutant General, Department of the Army
DALO	Office of the Deputy Chief of Staff for Logistics (file symbol)
DAMI	Office of the Assistant Chief of Staff for Intelligence (file symbol)
DAMPL	Department of the Army Master Priority List
DAMO	Office of the Deputy Chief of Staff for Operations and Plans (file symbol)
DAPE	Office of the Deputy Chief of Staff for Personnel (file symbol)
DARCOM	US Army Materiel Development and Readiness Command
DCSLOG	Deputy Chief of Staff for Logistics

DCSOPS	Deputy Chief of Staff for Operations and Plans
DCSPER	Deputy Chief of Staff for Personnel
DCSRDA	Deputy Chief of Staff for Research, Development and Acquisition
DESCOM	US Army Depot System Command
DFSC	Defense Fuel Supply Center
DG	Defense Guidance
DLA	Defense Logistics Agency
DNBI	disease and nonbattle injuries
DOD	Department of Defense
DODI	Department of Defense Instruction
DPSC	Defense Personnel Support Center
DS	direct support
DSCMP	display computer indication
EDATE	effective date
EDD	equipment density data
EEA	essential elements of analysis
EOP	emergency operation procedures
ERD	equipment required data
ESC	US Army Engineer Study Center
FAM	full Army mobilization
FAS	Force Accounting System
FBH	Fort Benjamin Harrison
FD	Force Management Directorate, ODCSOPS (file symbol)
FDA	Force Accounting and Systems Division, ODCSOPS (file symbol)

FDD	force design division
FDF	Force Structure Plans Division, ODCSOPS (file symbol)
FDP	Force Structure Management Division, ODCSOPS (file symbol)
FDMIS	Force Development Management Information System
FEBA	forward edge of the battle area
FHC	female health and comfort items
GMPA	General Materiel and Petroleum Activity
GS	general support
HQDA	Headquarters, Department of the Army
IIQ	initial issue quantity
IOC	initial operational capability
IPR	in-process review
ITAC	Intelligence Threat Analysis Center
J-4	JCS Logistics Directorate
J-5	JCS Plans and Policy Directorate
JSCP	Joint Strategic Capabilities Plan
JCS	Joint Chiefs of Staff
JSPDSA	Joint Strategic Planning Document Supporting Analysis
JSPS	Joint Strategic Planning System
KIA	killed-in-action
K-kill	catastrophic-kill
LAD	latest arrival date
LASH	lighter aboard ship
LDB	logistics data base

LEA	Logistics Evaluation Agency
LIN	line item number
LINCODE	line item of equipment
LOC	location
LOGSACS	Logistic Structure and Composition System
MACOM	major Army command
MACRIT	manpower authorization criteria
M Force	Master Force (Army)
MIA	missing-in-action
MICOM	US Army Missile Command
MIE	major items of equipment
MILPERCEN	US Army Military Personnel Center
MNBN	maneuver battalion
MOS	military occupational specialty
MRA&L	Manpower, Reserve Affairs and Logistics (OSD)
MRC	Materiel Readiness Command
MRS	mobilization reserve stocks
MTBF	mean time between failure
MTOE	modified tables(s) of organization and equipment
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, chemical
NGB	National Guard Bureau
NTREF	note reference
NSN	national stock number

ODCSOPS	Office of the Deputy Chief of Staff for Operations and Plans
OMA	operation and maintenance, Army
OMNIBUS	US Army Operational Readiness Analysis
ORF	operational readiness float
OSD	Office of the Secretary of Defense
OST	order ship time
OTSG	Office of the Surgeon General
OWRMR	other war reserve materiel requirement
PAAL	unit identification code list
PA&E	Program Analysis and Evaluation (OSD)
PDB	procurement data base
PEM	phased equipment modernization
PERSACS	Personnel Structure and Composition System
PL	Plans, Force Structure and Systems Directorate, ODCSLOG (file symbol)
PLF	Force Structure and Sustainability Division, ODCSLOG (file symbol)
POL	petroleum, oils, and lubricants
POM	Program Objective Memorandum
POMCUS	prepositioned materiel configured to unit sets
POW (PW)	prisoners of war
PPBS	Planning, Programing and Budgeting System
[illegible]	primary mobilization; early mission Reserve Component units
	peacetime replacement factor
	prepositioned war reserve materiel requirements

PWRMS	prepositioned war reserve materiel stock
PWRR-MF	prepositioned war reserve requirements--medical facilities
RC	Reserve Component
RCF	repair cycle float
RDAISA	US Army Research, Development and Acquisition Information System Agency
RDD	required delivery date
RDF	Rapid Deployment Force
RDT	resupply delay time
RDTE	research, development, test, and evaluation
RIC	routing identifier code
ROK	Republic of Korea
RO-RO	roll on-roll off
RQ	Requirements Directorate, ODCSOPS (file symbol)
RQR	Requirement Programs and Priorities Division, ODCSOPS (file symbol)
RSSP	ration supplement sundries pack
SACS	Structure and Composition System
SB	supply bulletin
SCS	special contingency stockpile
SEC	secondary
SECDEF	Secretary of Defense
SELCOM	Select Committee (Army)
S-Force	SACS Force
SHN	shorthand note

SICC	Service Item Control Center
SMZ-D	Supply and Maintenance Directorate, ODCSLOG (file symbol)
SPARC	sustaining predictions for repair parts for combat
SPC	Strategy and Planning Committee (Army)
SRC	standard requirements code
SS	Strategy, Plans and Policy Directorate, ODCSOPS (file symbol)
SSA	Security Assistance Division, ODCSOPS (file symbol)
SSN	special study number
STAGR	strength aggregation
STON	short ton(s)
SWA	Southwest Asia
TAA	Total Army Analysis (study)
TAADS	The Army Authorization Documents System
TAEDP	Total Army Equipment Distribution Program
TAEDPS	Total Army Equipment Distribution Program System
TAGO	The Adjutant General's Office
TARCOM	US Army Tank-Automotive Materiel Readiness Command
TARP	Total Army Requirements Program
TDA	tables of distribution and allowances
TLRS	Total Logistics Readiness/Sustainability Analysis (study)
TOE	table(s) of organization and equipment
TPSN	troop program sequence number
TR	Training Directorate, ODCSOPS (file symbol), theater reserve

TRADOC	US Army Training and Doctrine Command
TRB	Technical Review Board
TRL/S	total logistics readiness/sustainability
TSARCOM	Troop Support/Aviation Materiel Readiness Command
T-tape	copy of the M Force used in TAA
TWR	total war reserve
UIC (UICCC)	unit identification code
UNTDS	unit description
US	United States
USACAA	US Army Concepts Analysis Agency
USACC	US Army Communications Command
USAFAS	US Army Field Artillery School
USALOGC	US Army Logistics Center
USAMMA	US Army Medical Materiel Agency
USAMSAA	US Army Materiel Systems Analysis Activity
USAMSSA	US Army Management Systems Support Agency
USAR	US Army Reserve
USAREUR	US Army, Europe
USASAP	US Army Support Activity, Philadelphia
USWR	United States war reserve
UTC	unit type code
WAFF	wartime fuel factors
WARF	wartime replacement factor(s)
WARRAMP	wartime requirements for ammunition, materiel, and personnel

WARSL	War Reserve Stockage List
WIA	wounded-in-action
WMR	war materiel requirement
WP	Warsaw Pact
WRMR	war reserve materiel requirement
WRSA	war reserve stock for allies

2. COMPUTER SYSTEMS, MODELS, AND SIMULATIONS

APP	Ammunition Postprocessor
BAM	Blue Artillery Model
CAM	Casualty Assessment Model
CEM	Concepts Evaluation Model
CORK	computer for use in firepower value, K-factor, and posture-factor computations
COSAGE	Combat Sample Generator
ELCON	Equipment Loss Consolidator Model
FASTALS	Force Analysis Simulation of Theater Administration and Logistics Support
HOVARM	Helicopter Model
ICM	Infantry Combat Model
MATCH	Force Match Algorithm
PFM	Patient Flow Model
PPP	Personnel Postprocessor
RAM	Red Artillery Model
SYMWAR	System for Estimating Materiel Wartime Attrition and Replacement Requirements
TAM	Target Acquisition Model

TATM	Tank/Antitank Model
TRANSMO	Transportation Model
TRM	Theater Rates Model
UDS	Unit Data System
WARFRAM	WARF Red Artillery Model
WIMP	WARF Intermediate Processor

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